25 Shelf G

2.54
Dick

LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

REPORT

ON THE

SCIENTIFIC RESULTS

OF THE

VOYAGE OF H.M.S. CHALLENGER

DURING THE YEARS 1873-76

UNDER THE COMMAND OF

CAPTAIN GEORGE S. NARES, R.N., F.R.S.

AND THE LATE

CAPTAIN FRANK TOURLE THOMSON, R.N.

PREPARED UNDER THE SUPERINTENDENCE OF

THE LATE

Sir C. WYVILLE THOMSON, Knt., F.R.S., &c.

REGIUS PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF EDINBURGH
DIRECTOR OF THE CIVILIAN SCIENTIFIC STAFF ON BOARD

AND NOW OF

JOHN MURRAY

ONE OF THE NATURALISTS OF THE EXPEDITION

BUREAU OF FISHERIES,
LIBRARY
No. 2443
WOODS HOLE, MASS.

ZOOLOGY—VOL. XVII.

PART L.—REPORT ON THE POLYZOA (PART II.)

BY GEORGE BUSK, F.R.S., V.P.L.S., &c.

UNITED STATES COMMISSION OF FISH & FISHERIES.
3044

39.47

Published by Order of Her Majesty's Government

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE

AND SOLD BY

LONDON :—EYRE & SPOTTISWOODE, EASTER HARDING STREET, FETTER LANE.

EDINBURGH :—ADAM & CHARLES BLACK.

DUBLIN :—HODGES, FIGGIS, & CO.

1886

Price Six Shillings.

3044

52 60

LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

PRINTED BY NEILL AND COMPANY, EDINBURGH,
FOR HER MAJESTY'S STATIONERY OFFICE.

EDITORIAL NOTE.

The First Part of the Report on the Polyzoa, treating of the Cheilostomata, by George Busk, Esq., F.R.S., was published in 1884 in Volume X., Zoology, forming Part XXX. of the Zoological Series of Reports. The present part forms the second and concluding portion of Mr. Busk's Report on the Polyzoa, and has a very special interest from being the last piece of scientific work accomplished by that distinguished veteran naturalist.

Mr. Busk, though in failing health during the last years of his life, yet struggled manfully amid many infirmities to complete this Report. The last instalment of the Manuscript was received by me on the 16th July last, and Mr. Busk had an opportunity of revising the proofs before his death, on the 10th August. A week or two later Miss Busk returned to me the whole Report for press.

John Murray.

Challenger Office, 32 Queen Street,
Edinburgh, *6th December* 1886.

THE

VOYAGE OF H.M.S. CHALLENGER.

ZOOLOGY.

REPORT on the POLYZOA collected by H.M.S. Challenger during the years 1873–76. By GEORGE BUSK, F.R.S., V.P.L.S., &c.

PART II.—The CYCLOSTOMATA, CTENOSTOMATA, and PEDICELLINEA.

INTRODUCTION.

So much has been written of late years concerning the Polyzoa, that it is not possible for me here to name all those to whom I have been indebted for assistance in the preparation of this Report, but among the most important recent contributions to our knowledge of all the three orders now under consideration, must be mentioned the valuable works of Mr. Hincks[1] and Professor Smitt.[2] To M. L. Joliet[3] we owe papers, both anatomical and descriptive, on the Polyzoa of the French Coast. Mr. P. H. Macgillivray,[4] has described and figured many new species of CYCLOSTOMATA belonging to the Australian region. Mr. Waters[5] has given descriptions of recent species from the Bay of Naples, as well as of fossil Australian species; and Dr. J. Jullien[6] of species collected in the

[1] Hincks, Brit. Mar. Polyz., 1880, and various papers in *Ann. and Mag. Nat. Hist.*, &c.

[2] Smitt, Hafs-Bryoz. Uteckl. och Fettkr., 1864; Bryoz. Mar., 1867; Kritisk Förteckn., 1865, 1871; Florid Bryoz., pt. i., 1872.

[3] Joliet, Les Bryozoaires des Côtes de France, *Archives d. Zool. Expér.*, t. vi., p. 193, 1877.

[4] Macgillivray, P. H., *Nat. Hist. Vict.*, decades iv. and vii.; *Proc. Roy. Soc. Vict.*, Polyzoa, parts iv. vi., vii., viii., ix.

[5] Waters, *Ann. and Mag. Nat. Hist.*, ser. 5, vol. iii.; *Quart. Journ. Geol. Soc.*, vol. xl. p. 674, 1884.

[6] Jullien, *Bull. Soc. Zool. de France*, t. vii., 1882.

Atlantic by the "Travailleur." With regard to the PEDICELLINEA I must express my obligations to Drs. Nitsche,[1] Hatschek,[2] Salensky,[3] &c., for the information derived from their researches.

The total number of species enumerated in this part of my Report is forty-six, of which number thirteen still appear to me to be new, and three or four others have only been described and named since the Challenger collection was made; if I have overlooked the descriptions of any others I can only express my regret that it should be so, as I have made every endeavour to keep pace with the recent additions to our knowledge on the subject.

Of the number of species above mentioned by far the greater part, viz., thirty-three, belong to the sub-order CYCLOSTOMATA, of which, however, only five are new. Of the CTENOSTOMATA there are only eleven species in all, but of these seven are new, though none of them present any new generic type; this very much larger proportion of new species can be accounted for probably by the fact that this sub-order has been much less fully studied hitherto than either the CHEILOSTOMATA or CYCLOSTOMATA. Belonging to the PEDICELLINEA, only two species have come under my notice, of which but one is now described for the first time, the other having been named by Mr. Hincks in 1884.

CLASSIFICATION.

1. The arrangement of the sub-order CYCLOSTOMATA followed in this Report, as exemplified in the accompanying Table (see p. viii.), is nearly the same as that adopted in my Monograph of the Crag Polyzoa, 1857, and in the British Museum Catalogue, pt. iii., 1875; the number of species procured by H.M.S. Challenger belonging to this sub-order not having been sufficiently large to lead to any material change in it.

2. In the sub-order CTENOSTOMATA, again, the number of species in the collection was too small to justify the attempt at forming any different general scheme, and therefore I have followed, as nearly as may be, the arrangement adopted by Mr. Hincks in his British Marine Polyzoa, only differing from him in the definition of the two principal divisions.

3. With respect to the order PEDICELLINEA all that I need say is, that though the total number of species collected on the voyage only amounted to two, they have appeared to me to deserve recognition as a new generic type, to which I have given the name of *Ascopodaria*, but it does not seem necessary for me to enter into any disquisition as to a scheme of classification beyond what has been already written by Mr. Hincks, Dr. Nitsche, Professor Smitt and others.

[1] Nitsche, *Zeitschr. f. wiss. Zool.*, Bd. xx. p. 343, 1870.
[2] Hatschek, *Zeitschr. f. wiss. Zool.*, Bd. xxix. p. 502, 1877.
[3] Salensky, *Ann. d. Sci. Nat.*, sér. 6, t. v. p. 27, 1877.

Distribution.

1. *Geographical.*

I have thought it convenient for the sake of uniformity, and to facilitate reference, to arrange the species enumerated in this second part of the Report into the following seven divisions of the ocean, in the same manner that the Cheilostomata were divided in the first part.

A. North Atlantic Region, between the parallels of 70° W. and 20° E.
B. South Atlantic Region, from 70° W. to 20° E.
C. South Indian or Kerguelen Region, from 20° E. to 110° E.
D. Australian Region, from 110° E. to 160° W. and S.
E. Philippine or Japanese Region, from 110° E. to 160° W. and N.
F. North Pacific Region, from 160° W. to the coast of North America.
G. South Pacific Region, from 160° W. to 70° W.; but from this region no species belonging to any of the orders referred to in this part of the Report were procured.

In the following List, to the names of the species procured at each Station a reference is added, by corresponding letters, to the other regions in which it was found, so that its geographical distribution may be seen at a glance.

2. *Bathymetrical.*

The Stations in each geographical region, in the List, are arranged in bathymetrical order, beginning with those of the greatest depth; it will be seen that only two species of Cyclostomata occur at depths greater than 1000 fathoms, viz., one at 1600 and one at 1450, the former, however, also being found at various depths, from 50 fathoms downwards; four or five others were found at 450 to 600 fathoms, but by far the larger number were procured at between 50 and 150 fathoms, and ten in shallow water. Of the Ctenostomata only three occurred at depths as great as 150 fathoms, the remaining eight having all come from depths less than 40 fathoms. The only two species belonging to the Pedicellinea group both came from 150 fathoms.

3. *Geological.*

To the sub-order Cyclostomata belong most of the oldest fossil Polyzoa that have been found up to this time, whilst "as yet we have no clear evidence that Cheilo-

stomatous types existed in Palæozoic times;"[1] although in the Mesozoic and Tertiary strata fossil CHEILOSTOMATA are numerous. The palæontological evidence as to the antiquity of the CYCLOSTOMATA is fully confirmed and strengthened by the embryological researches that have recently been so carefully and accurately made by various authors; for instance M. Barrois[2] says that the study of the structure of the larva and of the formation of the cell coincides with palæontology in furnishing us with perfectly concordant results, which are conclusive as to the antiquity of the CYCLOSTOMATA. Many of the species even have a wide distribution in time, for out of the thirty-three included in this collection, fourteen have already been identified in the fossil state.

No fossil forms belonging either to the CTENOSTOMATA or to the Entoproctan Polyzoa have hitherto been identified, but Mr. Vine has thrown out a hint, in a paper on *Ascodictyon*,[3] that perhaps *Ascodictyon filiforme* may be a primitive representative of the stoloniferous Vesiculariadæ, or possibly of the Entoprocta. That this latter order is of great antiquity is also confirmed by its embryonic history, for the same eminent authority, above quoted, M. Barrois,[4] after the most careful and elaborate comparison of the larvæ of the various Ectoproctan and Entoproctan groups, comes to the conclusion that "the larvæ of Entoprocta represent the primitive type from which all the others are derived."

A.—NORTH ATLANTIC REGION.

STATION 75, lat. 38° 38′ N., long. 28° 28′ 30″ W.; 450 fathoms; volcanic mud.

Idmonea milneana, C. | *Idmonea irregularis.*

CAPE VERDE ISLANDS, 100 to 120 fathoms.

Hornera frondiculata.

STATION 36, lat. 32° 7′ 25″ N., long. 65° 4′ W., off Bermuda; 30 fathoms; coral.

Crisia denticulata, var. *patagonica.* | *Amathia lendigera.*

CAPE VERDE ISLANDS, 10 fathoms.

Crisia conferta, D.

STATION 109, 0° 55′ 38″ N., long. 29° 22′ 35″ W., off St. Paul's Rocks; shallow water.

Crisia denticulata, B, D.

[1] Vine, *Quart. Journ. Geol. Soc.*, vol. xl. p. 332, 1884.
[2] Barrois, *Ann. and Mag. Nat. Hist.*, ser. 5, vol. x. p. 391 (footnote).
[3] Vine, *Ann. and Mag. Nat. Hist.*, ser. 5, vol. xiv. p. 87.
[4] Barrois, *loc. cit.*, p. 401.

B.—SOUTH ATLANTIC REGION.

Station 320, lat. 37° 17′ S., long 53° 52′ W.; 600 fathoms; green sand.

Crisia acuminata.
Idmonea marionensis, C.
Idmonea fissurata.
Hornera lichenoides.

Station 135, lat. 37° 1′ 50″ S.; long. 12° 19′ 10″ W., off Tristan da Cunha Islands; 60 to 360 fathoms.

Crisia biciliata.
Crisia denticulata, A, D.
Crisia acuminata.
Crisia cylindrica.
Idmonea atlantica.
Alecto granulata.
Diastopora patina.
Lichenopora fimbriata.
Lichenopora hispida.
Fasciculipora ramosa.
Ascopodaria discreta.

Station 142, lat. 35° 4′ S., long. 18° 37′ E.; 150 fathoms; green sand.

Alcyonidium flustroides.

Off Bahia, 10 to 40 fathoms.

Amathia distans.
Amathia brasiliensis.
Farrella atlantica.

Simon's Bay, Cape of Good Hope; 18 fathoms.

Idmonea atlantica.

Station 315, lat. 51° 40′ S., long. 57° 50′ W.; 12 fathoms; sand and gravel.

Tubulipora flabellaris.
Tubulipora fimbria.

C.—SOUTH INDIAN OR KERGUELEN REGION.

Station 147, lat. 46° 16′ S., long. 48° 27′ E.; 1600 fathoms; Diatom ooze.

Idmonea marionensis, B.

Prince Edward Island, 80 to 150 fathoms.

Crisia holdsworthii.
Idmonea marionensis, B.
Idmonea milneana, A.
Pustulopora proboscidea.

Station 149, off Kerguelen Islands; 28 to 105 fathoms.

Crisia eburnea, var. laxa.
Idmonea atlantica.

STATION 151, off Heard Island; 75 fathoms; volcanic mud.

Idmonea marionensis, B. | *Pustulopora proboscidea.*
Hornera violacea. | *Pustulopora deflexa.*
Supercytis tubigera.

STATION 144A, lat. 46° 48′ S., long. 37° 49′ 30″ E., Marion Islands; 69 fathoms; volcanic mud.

Crisia holdsworthii. | *Idmonea australis*, D.
Idmonea marionensis, B. | *Pustulopora proboscidioides.*

D.—AUSTRALIAN REGION.

STATION 176, lat. 18° 30′ S., long. 173° 52′ E.; 1450 fathoms; Globigerina ooze.
Crisia elongata.

STATION 163A, lat. 36° 59′ S., long. 150° 20′ E., off Twofold Bay; 150 fathoms; green mud.

Crisia conferta, A. | *Amathia tortuosa.*
Amathia spiralis. | *Ascopodaria fruticosa.*

STATION 167, lat. 39° 32′ S., long. 171° 48′ E.; 150 fathoms; blue mud.
Supercytis digitata.

STATION 162, lat. 39° 10′ 30″ S., long. 146° 37′ E., Bass Strait; 38 fathoms; sand and shells.

Pustulopora regularis. | *Amathia spiralis.*

STATION 163B, lat. 33° 51′ 15″ S., long. 151 22° 15″ E., off Port Jackson; 35 fathoms; hard ground.

Idmonea australis, C. | *Hornera foliacea.*

STATION 161, lat. 38° 22′ 30″ S., long. 144° 36′ 30″ E., off Port Philip; 33 fathoms; sand.

Crisia acropora. | *Hornera foliacea.*
Amathia spiralis.

STATION 188, lat. 9° 59′ S., long. 139° 42′ E.; 28 fathoms; green mud.

Amathia semispiralis. | *Vesicularia papuensis.*
Cylindræcium papuense.

STATION 172, lat. 20° 58′ S., long. 175° 9′ W., off Nukalofa, Tongatabu; 18 fathoms; coral mud.

Idmonea radians, F.

STATION 186, lat. 10° 30′ S., long. 142° 18′ E., off Cape York; 8 fathoms; coral mud.

Crisia denticulata, A, B. | *Idmonea eboracensis.*

Amathia connexa.

E.—PHILIPPINE OR JAPANESE REGION.

OFF ZEBU, Philippine Islands.

Crisia denticulata, var. *gracilis.*

F.—NORTH PACIFIC REGION.

OFF HONOLULU, Sandwich Islands; 20 to 40 fathoms.

Idmonea radians, D.

G.—SOUTH PACIFIC REGION.

None.

MEASUREMENTS.

The metrical system is now so generally in use for scientific purposes that I have adopted it for all the measurements of the magnified figures, and they are accordingly given in millimetres or tenths of a millimetre. The figures are nearly all enlarged by 25 or 50 diameters, and scales are appended to all the plates.

Table of Classification.

Group A. ECTOPROCTA.

Sub-order II. CYCLOSTOMATA.

			PAGE
Division I. Articulata s. Radicata.			
	I. Crisiadæ, . .	*Crisia*, . . .	2
Division II. Inarticulata.			
Subdivision A. Erecta.	II. Idmoneidæ, . .	*Idmonea*, . .	9
		Hornera, . .	14
		Pustulopora, . .	18
Subdivision B. Adnata s. Decumbentia.	III. Tubuliporidæ, .	*Alecto*, . . .	22
		Tubulipora, . .	22
	IV. Diastoporidæ, .	*Diastopora*, . .	24
	V. Lichenoporidæ, .	*Lichenopora*, . .	25
	VI. Frondiporidæ, .	*Fasciculipora*, . .	27
		Supercytis, . .	28

Sub-order III. CTENOSTOMATA.

Division I. Halcyonellea.			
	I. Alcyonidulæ, .	*Alcyonidium*, . .	31
Division II. Vesicularina.			
	II. Vesicularidæ, .	*Amathia*, . .	33
		Vesicularia, . .	36
		Farrella, . .	37
	III. Cylindrœcidæ, .	*Cylindrœcium*, .	38

Group B. ENTOPROCTA.

Order PEDICELLINEA.

	I. Pedicellinidæ, .	*Ascopodaria*, . .	4

DESCRIPTION OF GENERA AND SPECIES.

Group A. **ECTOPROCTA.**

Sub-Order II. **CYCLOSTOMATA,** Busk.

Cyclostomata, Bk., Smitt, Hincks, Auctt.
Tubuliporina, M.-Edwards, Johnst., &c.
Auloporina and *Myrioporina* (pars), Ehrenberg.
Cerioporina (pars), Bronn.
Centrifuginea (pars), d'Orbigny.
Milléporés à cellules (pars), Blainville.

Character.—Zoœcia tubular, calcareous, partially free or wholly connate or immersed; aperture terminal, inoperculate.

Division I.—ARTICULATA seu RADICATA.

Radicellata, d'Orbigny, Hincks, Smitt, &c.
Articulatæ s. Radicatæ, Bk., Crag Polyz.

Character.—Zoarium branched, divided into distinct internodes by flexible chitinous joints; affixed by chitinous, or calcareous jointed stoloniform radical tubes. Zoœcia disposed in single or double longitudinal series, all facing in one direction.

Family I. Crisiadæ.

Les Crisies, M.-Edwards.
Crisiadæ, Johnst., Busk, &c.
Crisiidæ, Busk, Hincks, &c.
Crisieæ, Smitt.
Crisidea, Reuss.
Crisidæ, d'Orbigny.

Character.—The only family.

The Family here contains :—

1. *Crisia.*

(1) *Crisia biciliata*, Macgilliv. (Pl. I. figs. 1, 2).
(2) *Crisia eburnea*, var. *laxa* (Pl. II. fig. 1).
(3) *Crisia denticulata*, Lamk. (Pl. II. fig. 3).
Crisia denticulata, var. *α*, *gracilis* (Pl. I. fig. 4).
Crisia denticulata, var. *β*, *patagonica*.
(4) *Crisia elongata*, M.-Edw. (Pl. I. fig. 3).
(5) *Crisia acuminata*, n. sp. (Pl. III. fig. 1).
(6) *Crisia acropora*, Bk.
(7) *Crisia holdsworthii*, Bk. (Pl. III. fig. 2).
(8) *Crisia conferta*, Bk. (Pl. II. fig. 5).
(9) *Crisia cylindrica*, n. sp. (Pl. II. figs. 2, 4).

1. *Crisia.*

Sertularia (pars), Linné.
Cellularia (pars), Pallas.
Cellaria (pars), Solander, Lamk.
Tibiana (pars), Lamk., Schweigger, Blainville, Lister.
Falcaria (pars), Oken, Gray.
Eucratea (pars), Esper, Lamx., Fleming, &c.
Crisia (pars), Lamx., Johnst., Gray, Auctt.
Crisidia (pars), M.-Edwards, Busk, d'Orbigny (1852).
Filicrisia, d'Orbigny (1851).

Character.—Zoœcia disposed in a single or double longitudinal series. Oœcia modified zoœcia, with a tubular aperture, walls punctate.

§ *α*. Uniserial.

Crisidia, M.-Edwards, Busk, Auctt.
Unicellaria (pars), Blainville.
Falcaria, Oken, Gray.
Tibiana, Lister (*nec* Blainville, Lamx.).
Unicrisia, d'Orb., Vine.

No species belonging to this section occurs in the Challenger collection.

§ *β*. Zoœcia disposed in a double series, opposite or alternate.

§§ *α*. Zoœcia opposite in pairs, from two to four (rarely six) in an internode.

Bicrisia, d'Orbigny.
Crisia (pars), Auctt.

(1) *Crisia biciliata,* Macgilliv. (Pl. I. figs. 1, 2).

Crisia biciliata, Macgilliv., Nat. Hist. Vict., Dec. iv. p. 37, pl. xxxix. fig. 2.

Character.—An opposite pair of perfect zoœcia in each internode, with a third intermediate aborted one between them, from which the succeeding pair or a branch arises. A pair of long, jointed spines articulated to the outer part of each zoœcium, excepting those bearing the secondary branches. Oœcia small, much elongated, pyriform, situated at the angle of a bifurcation. Zoœcia 0·07 mm. in diameter.

Habitat.—Station 135, Tristan da Cunha, 60 to 1100 fathoms, rock and shells; [Williamstown, Mapleston; Warrnambool, Watts].

As Mr. Macgillivray remarks (p. 38) "The aspect and general arrangement of the cells are the same as in *C. edwardsiana,* d'Orb. There are two cells in each internode, except in those from which the branches originate. The cells, as he observes, are not so long as those represented in M. d'Orbigny's figure of *C. edwardsiana,* and are wider superiorly, and the free part is not so long, and is much more abruptly curved forwards; the oœcial cell is smaller, more elongated, and each lateral cell supports usually two, but sometimes only one long-jointed spine."

Mr. Macgillivray further remarks that he is doubtful to what species my description and figures of *Crisia edwardsiana* (Brit. Mus. Cat., pt. iii. p. 5, pl. ii. figs. 5–8) refer, and I am compelled to say that subsequent examination of the specimens from which that description was chiefly drawn, some of which were from Tierra del Fuego, collected by Mr. Darwin, and others from New Zealand, procured by Dr. Sinclair, has left considerable doubt in my mind as to the identity of these two forms; the latter, it is highly probable, is distinct from the Patagonian *Crisia edwardsiana,* in which the zoœcia, as represented by M. d'Orbigny, are very long and erect, whilst in the New Zealand species they are short and curved forwards. There is also another form or variety closely approaching the New Zealand species, but in some measure intermediate between that and the South American one, which may turn out to be distinct from either, and to form an intermediate variety, characterised by a tendency to have two or more pairs of cells in some of the internodes, and less exactly opposite. All three, however, are furnished with only a single articulated spine, which arises close below the mouth, instead of low down the back as in *Crisia biciliata.* One character is observable in the New Zealand form which I have not noticed in the others, viz., that the dorsal aspect of the pair of zoœcia is entire, and faintly striated transversely.

§§ *b.* Zoœcia numerous (more than six) in each internode, alternate on the two sides. Oœcia irregularly disposed, often absent.

Crisia (pars), Auctt.

(2) *Crisia eburnea*, var. *laxa* (Pl. II. fig. 1).

Sertularia eburnea, Linné.
La Sertolara d'avorio, Cavolini, Sprengel.
Cellularia eburnea, Pallas, Bruguières.
Cellaria eburnea, Soland., Bosc, Lamarck, Johnst., Transact. Newc. Soc., vol. ii. p. 262, pl. xi. fig. 5.
Crisia eburnea, Lamx., M.-Edwards, Fleming, Johnst., Templeton, Blainville, Risso, Couch, Hincks, Norman, Alder, Hassall, Van Beneden, Rech. s. l'Anat. des Bryoz., Mém. Brux., t. xviii. p. 52, pl. vi. figs. 12–16; Busk, d'Orbigny, Pal. Franç., p. 598; Joliet, Arch. de Zool. Expér. et Gén., vol. vi., 1877.

Character.—Zoarium small, tufted. Zoœcia usually three to seven in each internode (rarely nine to eleven) loosely aggregated. Branches usually arising from the first or lowest zoœcium in an internode, sometimes from the second or third. Aperture circular, sometimes slightly pointed on one side. Oœcia pyriform, surface even. Branches 0·15 mm., zoœcia about 0·07 mm. in diameter.

Habitat.—Station 149, D. and I., off Kerguelen Island, 28 to 105 fathoms, volcanic mud.

[Seas of Europe; Spitzbergen, Smitt; Madeira; Adriatic; Roscoff, Joliet.]

Except in its rather more loose mode of growth this form does not differ in any essential character from the common *Crisia eburnea*.

(3) *Crisia denticulata*, Lamarck, sp. (Pl. II. fig. 3).

Cellaria denticulata, Lamk.
Crisia luxata, Fleming, Blainville, Johnston (ed. 1), Couch.
Crisia denticulata, M.-Edw., Johnst., ed. 2, p. 284, pl. l. figs. 5–6; Gray, Sars, d'Orb., Gosse, Alder, Busk, Hincks, Norman, Smitt, Krit. Fört. öfver Skand. Hafs-Bryoz., p. 117 (*nec* Floridan Bryoz.); Waters, Ann. and Mag. Nat. Hist., ser. 5, vol. iii. p. 269; Vine, Joliet.
Cellaria arctica, Sars (teste Smitt).

Character.—Zoarium 1 to 3 inches high, of straggling growth. Zoœcia almost straight, connate nearly throughout their entire length. Aperture elliptical, usually pointed on one side. Oœcial cells truncate, often with three or more transverse annulations. Branches usually arising in an internode from or above the fourth cell (sometimes from the second in the lower parts of the zoarium). Branches 0·23 mm., zoœcia 0·07 mm. wide.

Habitat.—Off St. Paul's Rocks, shallow water. Station 186, lat. 10° 30′ S., long. 142° 18′ E., 8 fathoms, coral mud. Off Inaccessible Island, Tristan da Cunha, 60 to 90 fathoms.

[Coasts of Britain and Ireland; Norway; Spitzbergen? Grand Manan? Stimps.; Bay of Naples; Roscoff.]

Var. *α. gracilis* (Pl. I. fig. 4).

Character.—Closely resembles *Crisia denticulata* but of far slenderer habit, rarely if ever presenting any longitudinal interspaces between the series of zoœcia; branches not more than 0·2 mm. wide; zoœcia about 0·06 in diameter.

Habitat.—Off Zebu, Philippine Islands.

Var. *β. patagonica*, d'Orbigny (?)

Crisia patagonica, d'Orb., Voy. Amér. Mérid., Polyp., p. 7, pl. i. figs. 1–3.

"Cells from nine to nineteen, straight, very distinct; branches arising from second or third cell; sometimes two from an internode, when the second arises from the sixth cell. Joints black." Diameter of branches about 0·23 mm., and of zoœcia 0·08 mm.

Habitat.—Station 36, off Bermudas, 30 fathoms, coral.

[Patagonia.]

(4) *Crisia elongata*, M.-Edw. (Pl. I. fig. 3).

Crisia elongata (?), M.-Edwards, Réch. sur les Crisies, p. 10, pl. vii. fig. 2; Busk, Brit. Mus. Cat., pt. iii. p. 3, pl. iv. figs. 5–6; Waters.

Character.—Zoarium composed of long straight branches. Zoœcia, twelve to twenty-one or more in each internode; often much produced and curved forwards. Aperture circular, even; branches arising from the fifth to the seventh zoœcium. Oœcial cells unknown. Surface finely granular. Branches 0·3 mm., zoœcia 0·07 mm. wide.

Habitat.—Station 176, lat. 18° 30′ S., long. 173° 52′ E., 1450 fathoms, Globigerina ooze.

[Red Sea or Mediterranean? M.-Edw.; Algoa Bay.]

Whether the specimen (the only one in the Challenger collection) here described and figured really be the form described by M. Milne-Edwards I am by no means now convinced, but it is the same as that to which I have given the same appellation in the British Museum Catalogue. One reason for the doubt is that M. Milne-Edwards describes his *Crisia elongata* as narrower than *Crisia denticulata*, while that I have to name is certainly quite as wide, if not wider, than the usual form of *Crisia denticulata*.

(5) *Crisia acuminata*, n. sp. (Pl. III. fig. 1).

Character.—Zoarium 1 to 2 inches high, composed of long, straggling, flexuose branches dividing once or twice dichotomously and terminating in two short bifurcations. One of the terminal zoœcia (usually the penultimate), is often produced into a long,

acute, tapering spine. The internodes comprise from seven to eleven zoœcia, usually seven or nine, and the branches always arise from the second. Zoœcia about half connate, produced above and curved abruptly forwards; aperture circular, even, border thin. Surface sparsely punctate; dorsal aspect finely striated, with a row of punctures down each interspace. Branches convex before and behind, and without any intermediate longitudinal space. Joints white or pale brown. Oœcial cells? Branches 0·2 to 0·25 mm., zoœcia 0·1 mm. wide.

Habitat.—Station 320, lat. 37° 17′ S., long. 53° 52′ W., 600 fathoms, green sand.

Somewhat like *Crisia denticulata*, but differing in the general habit which is characterised by the very long, straggling, wavy, or flexuose, sparingly forked branches, terminating in two or three short forks. Many of the ultimate segments exhibit a longer or shorter, acutely tapering, pointed spine, formed of a metamorphosed zoœcium. A similar disposition may be occasionally seen in a species of *Crisia*, to which I have given the name of *Crisia sinclairensis* (Brit. Mus. Cat., pt. iii. p. 6, pl. iv. figs. 7–11), but in this species the spinous process thus formed is much more obtuse, and there are other differences which prevent their being considered the same.

(6) *Crisia acropora*, Busk.

Crisia acropora, Bk., Voy. of Rattles., vol. i. p. 351; Brit. Mus. Cat., pt. iii. p. 6, pl. v. figs. 3–4; Macgilliv., *loc. cit.*, Dec. iv. p. 38, pl. xxxix. fig. 3.

Character.—Cells nine to thirteen in each internode; a conical tooth (sometimes bifid) behind the orifice. Zoœcia slightly compressed; surface closely punctured, brilliant, sometimes porcellanous. Branches arising from the second to the fourth zoœcium. Oœcial cells large, pyriform, frequently annulated. Branches 0·25 mm., and zoœcia about 0·06 mm. wide.

Habitat.—Station 161, off Port Philip, 33 fathoms, sand.

[Bass Strait, R.; Williamstown and Queenscliff, Macgilliv.]

In this species the radical tubes are much curled, always arising from the bottom of the lowest cell in an internode, behind.

(7) *Crisia holdsworthii*, Busk (Pl. III. fig. 2, oœcium).

Crisia holdsworthii, Busk, Brit. Mus. Cat., pt. iii. p. 7, pl. vi.B fig. 2.

Character.—Zoœcia nine to eleven in each internode, connate throughout, with a short, tubular, cylindrical prolongation projecting directly forwards; walls very delicate, sparsely punctured; branches arising usually from the third, but in the lower internodes

not unfrequently from the second cell. Oœcial cell infundibuliform, rounded at the top. Branches 0·2 mm., and zoœcia 0·08 mm. wide.

Habitat.—Off Marion Island, 50 to 75 fathoms; off Prince Edward Island, 80 to 150 fathoms.

[Ceylon, Holdsworth.]

Habit very delicate and slender. May be allied to *Crisia tenuis*, Macgilliv. (*loc. cit.*, p. 39, pl. xxxix. fig. 5), in which, however, the zoœcia appear to be less closely connate. In the specimens brought by Mr. Holdsworth from Ceylon there were no oœcia; on which account I have given a figure of that organ from the Challenger collection.

(8) *Crisia conferta*, Busk (Pl. II. fig. 5).

Crisia conferta, Bk., Brit. Mus. Cat., pt. iii. p. 7, pl. vi.A fig. 5.

Character.—Zoarium tufted, composedof short, thick, curved branches radiating as it were from a short central stem. Zoœcia thirteen to twenty-one in an internode; nearly the upper half free, cylindrical, curved abruptly forwards; orifice orbicular or subelliptical, of the same diameter as the tube; branches one to four from each internode, not opposite. Oœcial cells closely adnate, median or axilliary; usually broadly truncate. Branches 0·35 mm., and zoœcia 0·07 mm. wide.

Habitat.—Off St. Vincent, Cape de Verde Islands, depth 10 fathoms. Station 163A, off Twofold Bay, 150 fathoms.

[Cape de Verde Islands, H.M.S. "Herald."]

A well-marked species, growing usually in dense tufts, and peculiar for the number of branches springing from an internode. The curved free portion of the cell is not, as is most usually the case, a mere production of the peristome marked with annular lines of growth, since the wall of that part is punctured like the rest of the zoœcium.

(9) *Crisia cylindrica*, n. sp. (Pl. II. figs. 2, 4).

Character.—Zoarium about $\frac{1}{2}$ an inch high, furcately branched; ten to thirty zoœcia in an internode; usually two branches given off from the longer segments, the lower from about the seventh zoœcium, and the upper near the summit of the internode. Zoœcia about half immersed, the upper part curved forwards, exceedingly delicate and thin-walled, without puncta; orifice circular, margin even. Branches perfectly cylindrical, with an even shiny surface, distinctly punctate; dorsal aspect obliquely striated, but quite even. Oœcial cells pyriform, usually axillary, with a wide tubular orifice. Diameter of branches about 0·15 mm., and of zoœcia 0·06 to 0·08 mm.

Habitat.—Off Nightingale Island, Tristan da Cunha, 100 to 150 fathoms.

A beautifully delicate form, distinguishable by its very slender habit and the perfectly cylindrical aspect of the branches, with the projecting cylindrical zoœcia, the projecting portion wholly oral. Its nearest ally would be *Crisia holdsworthii.*

Division II.—INARTICULATA.

Centrifuginés empâtés à cellules non operculées, d'Orb., Palæont. Franç., p. 605 (pars).
Inarticulatæ seu affixæ, Bk., Crag Polyzoa, p. 93.
Incrustata, d'Orbigny, Smitt.

Character.—Zoarium continuous, not divided into distinct internodes, fixed by a contracted calcareous base, either erect and free, or immediately adnate upon foreign bodies, and recumbent in whole or in part.

Subdivision A. ERECTA.

Family II. Idmoneidæ, Busk.

Tubigeridæ (pars), d'Orbigny, *loc. cit.*, p. 698.
Tubuliporidæ (pars), Johnst., Smitt, Hincks.
Les Tubuliporiens (pars), Milne-Edwards.
Idmoneidæ, Bk., Crag Polyzoa, p. 94; Brit. Mus. Cat., pt. iii. p. 10; Macgilliv.
Idmoneadæ, Bk., Engl. Cyclopedia, art. Polyzoa.
Horneridæ, Hincks.

Character.—Zoarium usually erect and rarely adnate, simple or branched; branches cylindrical, subcylindrical, or triangular, free or anastomosing.

The Family here contains the following genera :—

1. *Idmonea*, Lamx.

§ *a.* The zoœcia all disposed in alternate series on each side of the front of the branches; the innermost the longest.

(1) *Idmonea atlantica*, E. Forbes.
(2) *Idmonea radians*, Lamk.
(3) *Idmonea marionensis*, Busk.
(4) *Idmonea australis*, Macgilliv. (Pl. III. fig. 3).
(5) *Idmonea eboracensis*, n. sp. (Pl. III. fig. 4).

§ *β*. The outermost zoœcia in the lateral series the longest; isolated zoœcia opening in the space on the front between the lateral series.

(6) *Idmonea milneana*, d'Orb.
(7) *Idmonea irregularis*, Meneghini.
(8) *Idmonea fissurata*, n. sp. (Pl. III. fig. 5).

2. *Hornera*, Lamx.

§ *a*. Zoarium branched, branches free or rarely inosculating.

§§ *a*. Oœcia dorsal; anterior surface of branches reticulato-fibrillate.

(1) *Hornera frondiculata*, Lamx.
(2) *Hornera lichenoides*, Linn.

§§ *b*. Oœcia anterior, either wholly or in part; surface in front not fibrillated or sulcate.

(3) *Hornera violacea*, Sars.

§ *β*. Zoarium foliaceous, branches connected by transverse tubules.

(4) *Hornera foliacea*, Macgilliv.

3. *Pustulopora*, Blainv.

(1) *Pustulopora proboscidea* (Pl. IV. fig. 1).
(2) *Pustulopora proboscidioides*, (Pl. IV. fig. 4).
(3) *Pustulopora deflexa*, Smitt (Pl. IV. fig. 3).
(4) *Pustulopora regularis*, Macgilliv. (Pl. IV. fig. 2).

1. *Idmonea*, Lamouroux.

Idmonea, Lamx., Exp. Méth., p. 80; Defrance, Blainville, M.-Edwards, Johnst., Lonsdale, Reuss, Michelin, Hagenow, d'Orb, 1852 (pars); Busk, Van Beneden, Hincks, Smitt (subgenus), &c.
Crisia (pars), d'Orbigny, Stoliczka.
Retepora (pars), Goldfuss, Lamk.
Diastopora (pars) Michelin.
Tubulipora (pars), Lamk., Smitt.
Crisina (pars), d'Orbigny, Smitt.

Character.—Zoarium erect, free or very partially adnate, branched dichotomously or irregularly; springing from a single tubular cell, having a constricted, basal, discoid expansion. Branches free or anastomosing; orifices of zoœcia disposed in parallel or subparallel, transverse or oblique, usually alternate series on the sides of the front of the

branches, which are usually flattened behind, and either angular or rounded on the anterior aspect.

§ *a*. The zoœcia all disposed in alternate series on each side of the front of the branches; the innermost the longest.

(1) *Idmonea atlantica*, E. Forbes.

Idmonea radians, Van Beneden, Bryoz. de la Mer du Nord, Bull. Brux., xvi. pt. ii. p. 646, pl. i. figs. 4, 6.

? *Idmonea coronopus*, Defrance, Dict. d. Sci. Nat., vol. xxii. p. 565; d'Orbigny, Milne-Edwards, Réch. sur les Crisies, p. 23, pl. x. fig. 3.

Idmonea atlantica, E. Forbes, MSS., Smitt, Johnst., Gray, Sars, Busk, Ann. and Mag. Nat. Hist., ser. 2, vol. xviii. p. 34, pl. i. figs. 6*a–e*; Quart. Journ. Micr. Sci., vol. vi. p. 128, pl. xviii. fig. 5; Rep. Brit. Assoc., 1859 (Trans. Sect.) p. 146; (var. *tenuis*) Brit. Mus. Cat., pt. iii. p. 11, pl. ix.; Smitt, Florid. Bryoz., p. 6, pl. ii. figs. 7, 8; Hincks, Waters, &c.

? *Idmonea angustata*, d'Orb., Palæont. Franç., p. 731.

Character.—Zoarium irregularly branched and usually more or less in one plane; branches triangular, one to four or five cells in each series, the innermost the longest; dorsal surface very minutely punctate; peristome entire, even. Oœcium anterior, subpyriform.

Habitat.—Off Nightingale Island, 100 to 150 fathoms. Station 149E, off Cape Maclear, Kerguelen, 30 fathoms. Simon's Bay, Cape of Good Hope, 18 fathoms.

[Arctic Seas; coast of Norway and Finmark; Shetland; var. *tenuis*, North Atlantic; Gulf of Florida, Smitt; Madeira (?); Bay of Naples; fossil in Italian Miocene and Canadian Post Pliocene (?).]

(2) *Idmonea radians*, Lamarck (sp.).

Retepora radians, Lamk., d'Orbigny.

Idmonea radians, Busk., Brit. Mus. Cat., pt. iii. p. 11, pl. vii. figs. 1–4; Macgilliv., Nat. Hist. Vict., Dec. vii. p. 30, pl. lxviii. fig. 3; Waters; Haswell, Proc. Linn. Soc. N. S. Wales, vol. iv. p. 350, vol. v. p. 35.

? *Hornera radiata*, Blainv., Man. d'Actin., p. 419.

Idmonée rayonnante, M.-Edw., *loc. cit.*, p. 25, pl. xii. fig. 4.

Character.—Zoarium usually procumbent, radiate in a more or less regular circle, stipitate, sometimes suberect, with elongated, straight, subparallel bifurcating branches. Branches keeled in front, rounded behind. Dorsal aspect longitudinally sulcate, with a series of long perforations or alveoli along the sulci; the sides and front pitted, sometimes almost reticulate. Zoœcia produced, gently curving forwards, somewhat tapering, often with a bilabiate orifice, about 0·06 mm. Branches 0·3 mm., series about 0·4 mm. apart. Usually only one or two zoœcia on the sides of the front, alternate, when more than one the inner one the longer. Oœcial chambers subglobular on the anterior aspect, close below, but not at a bifurcation; surface coarsely pitted or foveolate.

Habitat.—Station 172, off Tongatabu, 18 fathoms, coral mud. Off Honolulu, 20 to 40 fathoms.

[Australian Seas *ubique*, New Zealand, &c.]

This species appears to occur under two rather distinct forms. In one (the typical) it constitutes a beautiful circular expansion, about one inch or more in diameter, composed of short bifurcating branches radiating from a central short stem (*vide* Brit. Mus. Cat., pt. iii. pl. vii. fig. 1*a*), or a more straggling growth in which the branches, though still springing from a more or less excentric point, are much longer, forming elongated forks (*loc. cit.*, fig. 1*b*), constituting a variety to which the term *stricta* might be applied. Very fine specimens of this form occur in the Challenger collection, from Honolulu, whilst a beautiful specimen of the radiate type was procured at Station 172, off Nukalofa, Tongatabu.

In all the Challenger specimens there is rarely more than one zoœcium to represent the lateral series, but in others there are occasionally as many as four (*vide* Brit. Mus. Cat., pt. iii. pl. vii. fig. 4), as described by Mr. Macgillivray. The great peculiarity of the species, however, is seen in the coarsely pitted or foveolate surface on the sides of the branches, and the series of large pores or pits along the dorsal sulci; the oœcial chambers also have peculiar sculpture.

(3) *Idmonea marionensis*, Busk.

Idmonea marionensis, Busk, Brit. Mus. Cat., pt. iii. p. 13, pl. xiii. figs. 3, 5; pl. vii. figs. 7, 8 (young state); Waters, Haswell.

? *Crisina hochstetteriana*, Stoliczka, "Novara" Exp., Geol. Theil, Bd. i. p. 113, Taf. xviii. fig. 3; Smitt, Florid. Bryoz., p. 6, pl. ii. figs. 11–13.

Character.—Zoarium slender, elongate, very sparingly branched; stem and branches cylindrical or subcylindrical. Zoœcia two to four in each series (most usually two) about 0·15 to 0·20 mm., series wide apart, 0·7 to 0·8 mm., when entire the innermost the longest. Surface finely but sparsely punctured; dorsal surface convex, with a fine longitudinal striation.

Habitat.—Off Marion Islands, 50 to 75 fathoms; off Prince Edward Island, 80 to 150 fathoms. Station 147, lat. 46° 16′ S., long. 48° 27′ E., 1600 fathoms, Diatom ooze. Station 151, off Heard Island, 75 fathoms, volcanic mud. Station 320, lat. 37° 17′ S., long. 53° 52′ W., 600 fathoms, green sand.

[? Auckland, New Zealand, fossil, Stoliczka; Bay of Naples and Marion Island, Waters; Queensland, Haswell.]

As I have remarked in Brit. Mus. Cat., this species seems to mark a transition between *Pustulopora* and *Idmonea*. The cells, however, are always disposed in rows or series on each side of the anterior aspect of the branch, and are for the most part deeply immersed;

the exserted portion being of a very thin and delicate texture rarely shows the orifice in a perfect condition. It may perhaps be identical with M. d'Orbigny's *Idmonea canariensis* (Palæont. Franç., p. 732); but as neither figure nor sufficient description of that species are given, and it is merely stated to be "slender as a thread and almost round, with very few cells," it is impossible to be certain.

(4) *Idmonea australis*, Macgillivray (Pl. III. fig. 3).

Idmonea australis, Macgilliv., *loc. cit.*, Dec. vii. p. 30, pl. lxviii. fig. 2.

Character.—Zoarium of small size ($\frac{1}{2}$ to $\frac{3}{4}$ inch), irregularly branched once, each short branch terminating in a single fork; branches contorted and sometimes twisted; four to six zoœcia in each series, the inner the longest; no intermediate longitudinal space in front between the series. Zoœcia very slender (0·12 mm.), connate below, but when perfect much produced or free for one-half or two-thirds of their length, slightly tapering, some nearly straight and ascending obliquely, but towards the upper part of the branches curved forwards, not flattened in front; series 0·7 to 1·0 mm. apart. Branches compressed, rounded both in front and behind, about 0·6 mm. wide, everywhere minutely dotted, up to the border of the aperture; dorsal surface very finely striated longitudinally, intermediate spaces with very minute dots in irregular longitudinal series.

Habitat.—Station 163B, off Port Jackson, 30 to 35 fathoms, rock. Off Marion Island, 50 to 75 fathoms.

[Port Philip Heads, 10 to 15 fathoms, Macgilliv.]

A very distinct and well-marked species, easily recognisable by the compressed form of the branches, which on section are oval, as well as by the extremely fine punctation, or rather white dotting of the surface, and the fine or close longitudinal striation of the dorsal aspect. It appears to vary very much in the length of the exserted portion of the zoœcia, which, in the specimens from Marion Island, forms more than half the length of the cell (Pl. III. fig. 3). The exserted part is very slightly tapering and no part of it appears to be peristomal, as the wall exhibits the minute punctation quite up to the orifice, and there is very rarely any appearance of annular lines of growth. None of the specimens present any oœcial chamber.

Mr. Macgillivray suggests that this species may prove to be a form of *Idmonea atlantica*, but for this view I can see no grounds whatever.

(5) *Idmonea eboracensis*, n. sp. (Pl. III. fig. 4).

Character.—Zoarium very small, not more than $\frac{1}{4}$ inch high; branches very short and irregular, once furcate, much compressed, 0·6 mm. wide; dorsal aspect rounded, longitudinally striated but not grooved. Striæ (fig. 4*c*), about 0·01 mm. apart, a single irregular

row of dots down each interspace. Zoœcia (0·1 mm.), usually four in each series, of uniform length, except the innermost, which is the longest; series 0·4 to 0·5 mm. apart.

Habitat.—Station 186, off Cape York, 8 fathoms, coral mud.

The collection affords only a single such specimen, but apparently mature, inasmuch as two of the branches are widely dilated at the second bifurcation into an elongated, deeply immersed oœcial chamber.

§ *β.* (subgenus *Tervia*).—The outermost zoœcium in each lateral series the longest; scattered zoœcia opening irregularly in the space between the lateral series.

Tervia, Jullien, Bull. Soc. Zool. de France, vol. vii. p. 500, 1882.

(6) *Idmonea milneana*, d'Orbigny.

Idmonea milneana, d'Orb., Voy. Amér. Mérid., "Polypiers" p. 20, pl. ix. figs. 17–21; Palæont. Franç., p. 732; Smitt, Florid. Bryoz., p. 8, pl. iii. figs. 14–17; Macgilliv., *loc. cit.*, Dec. vii. p. 29, pl. lxviii. fig. 1; Busk, Brit. Mus. Cat., pt. iii. p. 12, pl. xi.; Waters, Haswell, Ridley.

? *Idmonea transversa*, Milne-Edw., *loc. cit.*, p. 26, pl. ix. fig. 3.

Character.—Zoarium spreading from a central peduncle, branching dichotomously. Branches depressed, broad, flattened or slightly rounded behind, 0·8 to 1·5 mm. wide; surface thickly punctate; on dorsal aspect irregularly striated longitudinally, and, except in the younger part, transversely wrinkled. Zoœcia about 0·2 mm. in diameter, usually four or more in a series, the outer the longer; a few intermediate zoœcia opening in the space in front between the lateral series; series 0·6 to 1 mm. apart. Oœcial chamber?

Habitat.—Station 75, lat. 38° 38′ N., long. 28° 28′ 30″ W., 450 fathoms, volcanic mud. Station 151, off Heard Island, 75 fathoms, volcanic mud. Off Prince Edward Island, 80 to 150 fathoms.

[Port Philip Heads, 10 to 15 fathoms, Macgilliv.; Falkland Islands, d'Orbigny; coast of Tierra del Fuego, and Patagonia, 30 fathoms; Chonos Archipelago, Darwin; Port Jackson and Queensland, Haswell.]

The cells, as Mr. Macgillivray observes, are usually four in series, the inner the least prominent, the others gradually increasing in length to the outer, which projects very much. They are united side to side throughout almost their whole length, so as to form regular walls, rising up and projecting far beyond the sides of the branches. As in several other species of *Idmonea* numerous radical tubes are given off from the back of the branches by which the growth is attached. The anterior median single zoœcia are few in number and usually nearly level with the surface. *Idmonea milneana* belongs to the group for which M. Jullien has proposed the name of *Tervia*, characterised by the

possession of an intermediate or azygos set of zoœcia on the front, and, it may be added, by the circumstance that the outermost zoœcium in the lateral series is the longest.

(7) *Idmonea irregularis*, Meneghini.

Idmonea irregularis, Meneghini, Mem. sui Polypi della Famiglia Tubuliporiani, p. 12 (*teste* Heller); Heller, Adriat., p. 121; Busk, Brit. Mus. Cat., pt. iii. p. 13, pl. xii.; Waters, Haswell.
? *Tervia folini*, Jullien, Bull. Soc. Zool. de France, vol. vii. p. 501, pl. xiii. figs. 8–9, 1882.

Character.—Zoarium composed of irregularly dichotomous, slender, rounded branches, 0·5 to 0·6 mm. wide. Zoœcia four to six in each lateral series, and the intermediate space in front occupied by numerous others irregularly scattered; series 0·6 to 0·8 mm. apart. Diameter of zoœcia 0·1 to 0·15 mm.; surface uniformly and thickly punctate; dorsum with longitudinal striæ wide apart. Oœcial chamber ?

Habitat.—Station 75, lat. 38° 38′ N., long. 28° 28′ 30″ W., 450 fathoms, volcanic mud.

[Adriatic, Meneghini, Heller; Mediterranean, H.M.S. "Porcupine"; Bay of Biscay, Jullien; Bay of Naples, Waters; Queensland, Haswell.]

(8) *Idmonea fissurata*, n. sp. (Pl. III. fig. 5).

Character.—Zoarium procumbent, composed of branches radiating irregularly from a central peduncle, dividing about twice dichotomously and appearing strongly serrated on the borders; branches 0·7 to 1 mm. wide. Zoœcia 0·15 to 0·2 mm. in diameter, with an elliptical aperture, closely adnate, the outermost the longest; a few isolated median zoœcia whose apertures are usually level with the surface. Lateral series 0·9 to 1·1 mm. apart. Surface of branches in front and behind deeply and irregularly sulcate and pitted.

Habitat.—Station 320, lat. 37° 17′ S., long. 53° 52′ W., 600 fathoms, green sand.

This species is at once recognisable by the peculiar fissured aspect of the surface, both in front and behind, and the numerous irregular pits with which it is studded. Its habit in some specimens is something like that of *Idmonea radians*, but much stronger. Like the others of the group to which it belongs, the branches appear serrated on each side.

2. *Hornera*, Lamouroux.

Hornera, Lamx., Expos., p. 41 (1821); Milne-Edwards (pars), Reuss (pars), Blainville (pars), Defrance, Michelin, Hagenow, d'Orbigny, Smitt, Hincks, Busk, Sars, &c.
Millepora (pars), Linné, Pallas, Esper, Solander.
Retepora (pars), Lamarck, Goldfuss.
Syphodictyum (pars), Lonsdale.

Character.—Zoarium ramose or foliaceous; zoœcia opening only on one side; oœcia dorsal or anterior.

§ *a. Ramosa.*—Zoarium branched, branches free or rarely inosculating, cylindrical or subcompressed.

§§ *a.* Oœcia dorsal; anterior surface of branches reticulato-fibrillate.

(1) *Hornera frondiculata*, Lamouroux.

Hornera frondiculata, Lamx., Exp., p. 41, pl. lxxiv. figs. 7–9; Milne-Edwards, *loc. cit.*, p. 17, pl. ix. figs. 1–1*c*.; Blainville, Man. d'Actin., p. 419; Heller, Adriat., p. 124; Busk, Brit. Mus. Cat., pt. iii. p. 17, pl. xx. figs. 1, 2, 3, 6; Manzoni, Waters.
Millepora tubipora, Ell. and Soll, p. 139, pl. xxxi. fig. 1.
Millepora lichenoides, Linné, Pallas, Esper.
? *Hornera affinis*, M.-Edw., *loc. cit.*, p. 9, pl. x. fig. 1.
? *Hornera andegavensis*, Mich., Icon. Zooph., p. 318, pl. lxxvi. fig. 8.
Hornera serrata et tubulosa (?), Meneghini, *loc. cit.*, p. 10.

Character.—Branches tapering, ramifying more or less in one plane, cylindrical or subcompressed; anterior surface strongly fibro-reticulate, divided into rhomboidal spaces in which are situated the orifices of the zoœcia, surrounded with numerous small pores. Orifice exserted, usually bifid; dorsal surface coarsely reticulate, granular or nearly smooth, with small elongated pores in the sulci. Oœcia oblong, carinate, ribbed; aperture tubular, superior. Diameter of branches about 0·6 mm., and of orifice 0·08 mm.

Habitat.—Porto Praya, St. Iago, Cape de Verde, 100 to 120 fathoms.

[Mediterranean, Adriatic (very abundant). Fossil in the Crag and Upper Tertiaries of Sicily, &c.]

(2) *Hornera lichenoides*, Linné (sp.).

Corallium, Pontoppidan, Norg. Natuurl., vol. i. p. 258, pl. xiv. figs. D.E.
Millepora lichenoides, Linné, Müller, Prodr., p. 252, No. 3046; Ström, Act. Hafn., vol. xii. p. 309, pl. iii. fig. 12; Fabricius, Zool. Samml. (*teste* Smitt), and Fauna Grœnl., p. 432 (*nec* Pallas).
Hornera frondiculata, Sars, Reise Lof. og Finm., Nyt Magazin f. Nat.-Vid., t. vi. p. 146; Busk, Ann. and Mag. Nat. Hist., ser. 2, vol. xviii. p. 34, pl. i. fig. 7*a*.
Hornera borealis, Busk, Crag Polyzoa, pp. 95–103; Alder, New British Polyzoa, Quart. Journ. Micr. Sci., N.S., vol. iv. p. 108, pl. v. figs. 1–6.
Hornera lichenoides, Smitt, Kritisk Förteckn., pp. 404, 469, pl. vi. fig. 10, pl. vii. figs. 1–14; Busk, Brit. Mus. Cat., pt. iii. p. 17. pl. xviii. figs. 5–6; Hincks, Brit. Mar. Polyz., p. 468, pl. lxvii. figs. 1–5.

Character.—Zoarium rising from a rather thick furrowed base, branched irregularly; branches dichotomous, crowded and straggling, often spreading out in a flabelliform

manner. Anterior surface obscurely fibro-reticulate, sparsely furnished with subtubular pores. Zoœcia on the front of the branches, immersed or very slightly prominent, those of the outer sides of the branches tubular, slightly expanded towards the orifice, which is more or less elliptical, with an entire border often much produced on one side; dorsal surface finely sulcate with minute pores in the sulci. Oœcia dorsal, subglobular or gibbous, the surface reticulate or coarsely punctured. Aperture tubular, lateral (from which a very slender rib stretches across to the opposite side, Hincks). Diameter of branches 0·5 to 0·6 mm., and of orifice about 0·1 mm.

Habitat.—Station 320, lat. 37° 17′ S., long. 53° 52′ W., 600 fathoms, green sand.

[Arctic Seas, Lovén; coasts of Scandinavia, Pantoppidan, Sars, Macandrew; Shetland, Barlee; Hebrides, Norman; Nova Zembla; Greenland, Lütken; St. Georges Banks, Smitt and Harger.]

§§ *b.* Oœcia anterior, either wholly or in part; dorsal surface granular or finely striate.

(3) *Hornera violacea*, Sars.

Hornera violacea (*forma violacea*), Smitt, *loc. cit.*, p. 404, Tab. vi. fig. 6–9; Sars, Geol. og zool. Jagtt. Reise Trondhj., 1862, Nyt Mag. Nat.-Vid., vol. xii. p. 282; Busk, Brit. Mus. Cat., pt. iii. p. 18, pl. xviii. figs. 1–4; Norman, Shetl. Dredg., Rep. Brit. Assoc., 1867, p. 310; Hincks, Brit. Mar. Polyz., i, p. 469, pl. lxvii. figs. 6–8, pl. lxii. figs. 2, 3.

Pustulopora orcadensis, Bk., Quart. Journ. Micr. Sci., 1860, vol. viii. p. 214, pl. xxxix. figs. 1, 2.

Character.—Zoarium more or less of a violet colour, branched, straggling; branches short, truncate, irregularly dichotomous. Zoœcia very irregularly disposed, sometimes crowded into small fasciculi, usually elongated; surface punctate (not reticulate); dorsal surface granular, or very finely striated with minute pores, often a rib-like elevation down the centre of the branch. Oœcia elongated, situated in the axils of the branches, usually more towards the dorsal aspect; surface smooth, finely punctate, with a thin median costa; orifice bilabiate near the top. Diameter of branches 0·4 to 0·7 mm., and of orifice 0·12 mm.

Habitat.—Station 151, off Heard Island, 75 fathoms, volcanic mud.

[Arctic and Northern Seas, generally distributed; Shetland.]

§ *β. fenestrata* (subgenus *Retihornera*).—Branches sub-parallel, connected by transverse tubules, so as to form an expanded frond with quadrangular fenestræ.

Retihornera (pars), Kirchenpauer, Cat. iv. of the Museum Godeffroy, 1869; Busk, Brit. Mus. Cat., pt. iii. p. 19.

(4) *Hornera foliacea*, Macgillivray.

Hornera foliacea, Macgilliv., Proc. Roy. Soc. Vict., vol. ix., p. 142, 1868.
Retihornera foliacea, Busk, Brit. Mus. Cat., pt. iii., p. 19, pl. xiii. figs. 1, 2, and pl. xix.; Haswell.
? *Retihornera dentata*, ? *Retihornera plicata*, Kirchenpauer.

Character.—Zoarium expanded, foliaceous, irregularly plicate or convoluted, rising from a short stem with a discoid base; main branches straight, parallel, connected by numerous transverse celliferous branches or trabeculæ, forming quadrangular fenestræ of pretty uniform size, from 0·7 to 2 mm. in length by 0·3 to 0·4 mm. wide, or about the width of the branches. Zoœcia in the young state exserted, with a usually bifid or toothed orifice, about 0·05 mm. in diameter. In the older condition more immersed, with an irregularly bifid or toothed, thickened, somewhat expanded orifice. Anterior surface fibro-reticulate, obscurely punctate and uneven; posterior sulcate, granular, obscurely punctured or pitted. Oœcia subglobose, dorsal; usually three zoœcia in the width of a branch, and one in a trabecula.

Habitat.—Station 161, off Port Philip, 33 fathoms, sand. Station 163B, off Port Jackson, 35 to 38 fathoms, rock.

[South Australia, Gould, Macgillivray; Queensland, Haswell.]

Although at one time inclined to regard the fenestrate form of *Hornera* as entitled to the rank of a distinct genus or subgenus, I no longer regard it as forming more than a subgenus, as in all essential characters it perfectly agrees with such forms as *Hornera lichenoides*, *Hornera frondiculata*, and *Hornera cæspitosa*, mihi., differing as do those species from *Hornera violacea* in having the anterior aspect fibro-reticulate, and the oœcia dorsal. In the Brit. Mus. Cat., pt. iii., p. 19, I have described *Hornera foliacea* as being furnished with delicate spiculæ projecting from the sides of the fenestræ, but it is highly probable that these are merely the spiculæ of some parasitic encrusting Sponge; in all other respects the form brought by Mr. Gould from South Australia in my collection, from which the account in the Brit. Mus. Cat. was drawn up, exactly agrees with the specimens in the Challenger collection, which again are undoubtedly the *Hornera foliacea* of Mr. Macgillivray. In one of the specimens is a shallow, circular, cup-shaped depression on the dorsal aspect, doubtless the remnant of an oœcium, but these organs would appear to be very rare.

3. *Pustulopora*, Blainville.

Pustulopora, Blainville (text), Man. d'Actin., p. 418, 1834; Milne-Edwards, Hagenow (*nec* Geinitz), Reuss, Michelin(?), Grube, Meneghini; Busk, Brit. Mus. Cat., pt. iii. p. 20, &c.; Macgilliv., Proc. R. Soc. Vict., December 1880, p. 6.

Pustulipora, Blainv. (index), Johnston, Gray, Sars, Joliet.

Tubulipora (pars), Couch.

Entalophora (pars), d'Orbigny (*nec* Lamouroux), Hincks, Brit. Mar. Polyz., p. 455; Smitt, Florid. Bryoz., vol. i. p. 11; Stoliczka, Waters, &c.

Character.—Zoarium erect, simple or branched, cylindrical; branches irregular, composed of tubular zoœcia partially or wholly connate or immersed; opening on all sides of the branch, and disposed quincuncially or irregularly, sometimes in more or less annular or subspiral order.

Although most recent writers, including such high authorities as Professor Smitt and Mr. Hincks, have adopted the name *Entalophora* for the genus here intended, I am inclined, with the greatest deference, to prefer M. de Blainville's and M. Milne-Edwards' name, for the reason that the species named *Entalophora* by Lamouroux appears to me to differ in at least one most important respect, it may be said, from all the other known Cyclostomata, and most certainly from all with which I am acquainted, either recent or fossil, viz., in the appendages, as he terms them, being trumpet-shaped, or gradually increasing in diameter as they increase in length. Whether this arises from an error of observation on the part of Lamouroux or of his draughtsman, or is the true condition, may perhaps admit of doubt; with the exception of M. Michelin (Iconog., pl. lvi. fig. 4), whose figure very strongly resembles that of Lamouroux, no one seems to have recorded any other form with trumpet-shaped tubes, and as even his figure does not represent them as having that form, I am much inclined to assume that Lamouroux's specimen is unique in that respect, and if correctly figured and described, that it must on that account alone be referred to a distinct generic type from all other known Pustuloporidæ, and in fact, as above observed, from all other Cyclostomata. (May it not be a coralline?).

On the other hand, M. de Blainville's definition of *Pustulopora*, as distinguished from Lamouroux's *Entalophora*, is so clear and precise, and his genus has met with the acceptance of M. Milne-Edwards, Hagenow, Reuss, and numerous others, and in fact may be said, until quite recently, to have been in full possession of the field, that I feel no hesitation in retaining it for all forms with cylindrical tubes of the same diameter throughout; and in relegating those forms, if there really be any, with trumpet-shaped tubes, to at least a distinct genus.

With respect to the spelling of the name there can be no doubt that *Pustulopora* is the correct way, *Pustulipora* being apparently merely a printer's error in the index to the Manuel d'Actinologie. In the text (*loc. cit.*) M. de Blainville has it *Pustulopora*. Mr. Macgillivray has passed over a similar misprint (*loc. cit.*) the name being spelled *Pustulopera* in the text and *Pustulopora* in the description of the plates.

(1) *Pustulopora proboscidea*, Milne-Edwards (Pl. IV. fig. 1).

Pustulopora proboscidea, M.-Edw., Sur les Crisies, p. 27, pl. xii. fig. 2; Heller, Adriat., p. 125; Grube, Die Insel Lussin, p. 68; Busk, Brit. Mus. Cat., pt. iii. p. 21 (*nec* pl. xviii. A); Haswell.

Pustulipora proboscidea, Johnst., p. 279, pl. xlviii. fig. 4; Gray.

Entalophora proboscidea, Waters, Bryoz. of the Bay of Naples, Ann. and Mag. Nat. Hist., ser. 5, vol. iii. p. 274 (1879); Vine.

To these Mr. Waters, Fossil Cyclostomatous Polyzoa from Australia, Quart. Journ. Geol. Soc., vol. xl., 1884, p. 686, adds the following fossil forms:—

Entalophora raripora, d'Orb., Prod. Pal. Strat., p. 267; Palæont. Franç., p. 787, pl. dcxxi. figs. 1–3, pl. dcxxiii. figs. 15–17; Beissel, Bryoz. Aach. Kreid., p. 82, pl. x. figs. 120–128.

Pustulopora virgula, Hagenow, Maast. Kreid., p. 17, pl. i. fig. 3.

Entalophora icaunensis, d'Orb., Palæont. Franç., p. 781, pl. dcxvi. figs. 12–14.

Entalophora attenuata, Stol., Bry. von Latdorf., p. 77, pl. i. fig. 1; Reuss (?), Bry. Crosaro, p. 74, pl. xxxvi. figs. 1, 2.

Entalophora anomale, Manzoni, Bry. Mioc. Aust. ed Ungh., p. 10, pl. ix. fig. 33.

Entalophora haastiana, Stol., Bry. Ora. Bay., p. 102, pl. xvii. figs. 4, 5.

Character.—Zoarium composed of long, straight, alternate, furcate, cylindrical branches, 0·4 to 0·9 mm. in diameter, constituted usually of four longitudinal alternate series of zoœcia which are exserted for about one-third of their length, the exserted tube curving outwards nearly at a right angle and constituted mainly of a peristomal production, ringed, thin, not punctate, with an entire circular orifice about 0·15 mm. in diameter; surface elsewhere finely punctate. Oœcia consisting apparently of a terminal expansion, or of one situated close to a bifurcation.

Habitat.—Station 151, off Heard Island, 75 fathoms, volcanic mud. Off Prince Edward Island, 80 to 150 fathoms.

[Shetland (?), E. Forbes; Mediterranean, Milne-Edwards; Adriatic, Heller; Naples, Waters; Teneriffe and Canaries, d'Orbigny; Madeira, I. G. I.; Gulf of Florida, Smitt; Port Jackson and Queensland, Haswell.]

With respect to the Shetland locality assigned to this species in the Brit. Mus. Cat. on the authority of E. Forbes, as its occurrence in that locality is not noticed either by Mr. Norman or by Mr. Hincks as a British form, and, moreover, is omitted by Professor Smitt in Lists of Scandinavian or Arctic Polyzoa, it is highly probable that some mistake has arisen. It would appear to be a Mediterranean and Atlantic form, extending as far south as the Kerguelen region.

(2) *Pustulopora proboscidioides*, Smitt (sp.) (Pl. IV. fig. 4).

Entalophora probosidioides, Smitt, Florid. Bryoz., vol. i. p. 11, pl. iv. figs. 26, 27.

Character.—Zoarium composed of elongated, forked, cylindrical branches, 0·7 to 1 mm. in diameter, constituted of about six longitudinal series of zoœcia, almost entirely immersed, except a short, cylindrical, exserted portion with a circular orifice, about

0·17 to 0·2 mm., which are disposed irregularly in circular whorls, about 1 mm. apart; surface rough, punctate, even, with very faint indication of longitudinal striation.

Habitat.—Off Marion Island, 50 to 75 fathoms.

(3) *Pustulopora deflexa*, Smitt (sp.) (Pl. IV. fig. 3).

Entalophora deflexa, Smitt, Florid. Bryoz., vol. i. p. 11, pl. v. figs. 28–30; Waters, Ann. and Mag. Nat. Hist., ser. 5, vol. iii. p. 274.

Pustulipora deflexa, Johnst., p. 279, pl. xlviii. fig. 5; Norman, Rep. Brit. Assoc., 1868, p. 310; Marion, Ann. d. Sci. Nat., sér. 6, t. viii. p. 1; Joliet.

Pustulopora deflexa, Heller, Adriat., p. 125.

? *Tubulipora deflexa*, Couch, Corn. Fauna, vol. iii. p. 107, pl. xix. fig. 4.

? *Stomatopora deflexa*, Hincks, Brit. Mar. Polyz., p. 437, pl. lvii. fig. 4.

? *Pustulopora clavata*, Busk, Crag Polyzoa, p. 107, pl. xvii. fig. 1.

Character.—Zoarium composed of very irregular furcate branches, 1 to 1·2 mm. in diameter, constituted of very long cylindrical or very slightly terete ascending zoœcia, often crowded together in fasciculate bundles and varying greatly in length; slightly produced orally, the produced portion curving slightly outwards; surface granular or uneven, sometimes transversely rugose, about 0·2 mm. in diameter. Oœcia ?

Habitat.—Station 151, off Heard Island, 75 fathoms, volcanic mud.

[South coasts of Britain; Shetland, Norman; Gulf of Florida, Smitt; Bay of Naples, Waters; Adriatic, Heller; Marseilles, Marion; Roscoff, Joliet.]

A peculiar feature of this species is the great disposition of the zoœcia to be collected into fasciculate bundles, somewhat in the same way apparently as they are described by Mr. Hincks in his *Stomatopora fasciculata*, from which, however, it differs in other more important particulars, such as the perfectly free and erect habit, and to judge from Mr. Hincks's figure, the less diameter of the zoœcial tubes, and their less entire immersion or connation. In *Stomatopora fasciculata*, moreover, the zoarium is described as having a dense and smooth surface and a dark brown colour.

Mr. Couch's description of *Tubulipora deflexa* is far too incomplete to afford any assistance towards its determination, and his figure is still less reliable. All he says is that the zoarium is erect, cylindrical, with waved tubes projecting from all parts. Mr. Hincks, however, states, with respect to his *Stomatopora deflexa*, that the "zoarium is in great part adherent; with linear branches expanding very slightly upwards, the extremities free, erect, subclavate. The zoœcia slender, disposed in pairs along the creeping portion, and semialternate or alternate, the oral extremity free, bent upwards, and projecting considerably." To this it may be added that Mr. Hincks rejects Professor Smitt's *Entalophora deflexa* as a synonym of his *Stomatopora deflexa*. So that on the whole it seems extremely doubtful what name should be assigned to the form here described, with respect to which all that appears to me to be certain is that the specimens (mere fragments) in the Challenger collection are identical with the form

described by Professor Smitt as *Entalopora deflexa*. It is scarcely possible that Mr. Hincks's *Stomatopora* should be the same, but to indicate the possibility that it may be a recent variety, I have retained the specific appelation for a decided *Pustulopora*, for which otherwise the name "*fasicularis*" would have been very appropriate.

(4) *Pustulopora regularis*, Macgillivray (Pl. IV. fig. 2).

Pustulopera (sic) regularis, Macgilliv., Proc. Roy. Soc. Vict., vol. xix., 1882, p. 292, pl. i. fig. 3.
? *Pustulopora subverticillata*, Busk, Crag Polyzoa, p. 108, pl. xviii. fig. 1*d*.

Character.—Zoarium branched, branches of uniform thickness (about 1 to 2 mm.), furcate and ending in a short fork. Entire surface studded with the exserted extremities of the immersed zoœcia, disposed quincuncially or in nearly regular subspiral series, and about eight in the width of the zoarium. Orifice 0·12 to 0·15 mm. in diameter. Surface of zoœcia punctate, except the peristomal production which is clear, vitreous, shining and ringed. Oœcia ?

Habitat.—Station 162, off East Moncœur Island, Bass Strait, 38 fathoms, sand and shells.

[Port Philip Heads, Macgilliv.]

Probably, as suggested by Mr Macgillivray, allied to *Entalophora subregularis*, d'Orbigny.

Subdivision B. ADNATA seu DECUMBENTIA.

Family III. Tubuliporidæ, Busk.

Tubuliporidæ, Bk., Crag Polyzoa; Brit. Mus. Cat. pt. iii. p. 23.
Tubuliporidæ (pars), Johnst., Blainville, Milne-Edwards ("*Tubulipores*"), Smitt, Alder, Gray, Hincks, Vine, &c.
Sparsidæ (pars) d'Orbigny.

Character.—Zoarium entirely adnate, partially erect from an expanded base, in shape linear, reniform, flabelliform, or claviform; simple or divided into branching lobes. Zoœcia distinct, more or less free and much elongated; irregularly disposed or ranged in more or less regular series, diverging from a mesial line. Oœcia formed by an inflation of the branch.

The Family here contains :—

1. *Alecto*, Lamx.
   (1) *Alecto granulata*, M.-Edw.
2. *Tubulipora*, Lamk.
   (1) *Tubulipora flabellaris*, Fab. (Pl. V. fig. 1).
   (2) *Tubulipora fimbria*, Lk. (Pl. V. fig. 2).

1. *Alecto*, Lamouroux.

Alecto, Lamx., 1821; Blainville, Johnston, M.-Edw., Busk., Michelin, Gray, Norman, Heller, &c.
Tubulipora (pars), Lamk., Smitt.
Stomatopora, Bronn, d'Orb., Hincks (pars), &c.
Aulopora (pars), Goldfuss, Reuss.
Diastopora, (pars), Smitt.
? *Proboscina* (pars), Audouin, d'Orb., Smitt (subgenus).

Character.—Zoarium closely adnate throughout; simple or branched; linear or ligulate. Zoœcia uniserial, or disposed in distant, more or less regular, transverse series of two to four.

(1) *Alecto granulata*, Milne-Edwards.

Alecto granulata, M.-Edw., Réch. sur les Crisies, p. 13, pl. xvi. fig. 3, 3*a*; Johnston (pars), Busk, Brit. Mus. Cat., pt. iii. p. 24, pl. xxxii. fig. 1; Joliet.
? *Alecto parasitica*, Heller, Manzoni.
Stomatopora granulata, d'Orb., *loc. cit.*, p. 836, pl. 628, figs. 5–8; Hincks, Brit. Mar. Polyz., p. 425, pl. lvii. figs. 1, 2.

Character.—Zoarium linear, branched, the branches often anastomosing. Zoœcia uniserial, decumbent, with the oral extremities raised, subventricose below; surface granular or coarsely ringed.

Habitat.—Off Inaccessible Island, Tristan da Cunha, 60 to 90 fathoms (on dead shell). [British and Irish coasts; Norway and Sweden, Roscoff, &c.]

2. *Tubulipora*, Busk.

Tubulipora, Bk., Engl. Cyclop., art. Polyzoa, col. xv.; Crag Polyzoa, p. 110; Lamouroux, Hagenow, &c., Bk., Brit. Mus. Cat., pt. iii. p. 24.
Tubulipora (pars), Lamarck, Blainville, M.-Edwards, Johnston, Lonsdale, Michelin, Reuss, d'Orbigny, Gray, Smitt (1867), Hincks, &c.
Ceriopora (pars), Hagenow.
Phalangella sp., Gray, Smitt (subgenus).
Proboscina sp., d'Orbigny.

Characters.—Zoarium springing from a minute subglobular or discoid cell, and expanding as it grows, into an irregularly lobate, or entire, reniform or fan-shaped, adnate growth, from which spring the elongated, cylindrical, tubular zoœcia, free or partially connate and ascending; disposed more or less regularly in series diverging from a mesial line or irregularly.

(1) *Tubulipora flabellaris*, Fabricius (sp.) (Pl. V. fig. 1).

Tubipora flabellaris, Fab., Faun. Grœnl., p. 430, 1780.
Tubulipora flabellaris, Manzoni, Hincks, Brit. Mar. Polyz., vol. i. p. 446, pl. lxiv. figs. 1–3.
Tubulipora (subgenus *Phalangella*) *flabellaris*, Smitt, 1866; Kritisk Förteckn., pp. 401, 455, pl. ix. figs. 6, 8.
Tubulipora phalangea, Couch, Corn. Fauna, vol. iii. p. 106, pl. xix. fig. 7; Johnston, Busk, Crag Polyzoa, p. 111, pl. xviii. fig. 6; Hincks, Devon. Cat., Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 308; Busk, Brit. Mus. Cat., pt. iii. p. 25, pl. xxiii.; Waters, &c.
Tubulipora verrucaria, M.-Edw. (pars), Réch. sur les Tubulipores, p. 3, pl. xii. fig. 1; Heller.
Phalangella phalangea, Gray.

Character.—Zoarium wholly adnate, suborbicular or reniform, or obsoletely lobate; tubular cells long, slender, 0·15 mm. in diameter, disposed in more or less regular, uniserial rows radiating from a mesial line. Walls of free portion of zoœcia ringed, not punctate. Basal expansion thickly punctate.

Habitat.—Station 315, lat. 51° 40′ S., long. 57° 50′ W., 12 fathoms, sand and gravel.

[British and Irish Seas; Arctic Sea; coast of Norway; South Labrador; Adriatic, Bay of Naples.]

Professor Smitt and Mr. Hincks appear to be so convinced that this is the form intended by Fabricius that I have thought it better to adhere to their determination and to adopt his appellation instead of Mr. Couch's.

One peculiarity as distinguishing this form from the very closely allied *Tubulipora fimbria*, Lamk., consists in the absence, so far as I have observed, of punctation of the walls of the tubular or free portion of the zoœcia, which in the latter species are sparsely punctate up to the border of the orifice, also the punctation of the basal expansion in *Tubulipora fimbria* is rather more sparse, and the spots or pores larger.

(2) *Tubulipora fimbria*, Lamarck (Pl. V. fig. 2).

? *Tubipora serteus*, Fab.
Tubulipora fimbria, Lamk., Hist. Anim. sans Vert., ed. 1, vol. ii. p. 163, ed. 2, vol. ii. p. 243; Smitt, (subgenus *Phalangella*), *loc. cit.*, p. 401, 452, pl. ix. fig. 5; Hincks, Brit. Mar. Polyz., p. 448, pl. lx. fig. 3.
Tubulipora fimbriata, M.-Edw., *loc. cit.*, p. 10, pl. xiv. fig. 2; Michelin, Iconog., p. 321, pl. lxxvii. fig. 7.
Tubulipora flabellaris, Johnst., p. 274, pl. xlvi. figs. 5, 6; Landsb., Pop. Hist. Brit. Zooph., p. 274, pl. xv. fig. 50; Busk, Crag Polyzoa, p. 111, pl. xviii. fig. 3, pl. xx. fig. 9; Brit. Mus. Cat., pt. iii. p. 25, pls. xxiv., xxv.; Hincks, Ann. and Mag. Nat. Hist., ser. 4, vol. xix. p. 109; Haswell, Joliet.

Character.—Zoarium adnate, flabelliform, often recurved on the sides. Zoœcia decumbent, irregularly disposed or very obscurely serial. Surface of basal expansion and tubes punctate, often transversely rugose. Zoœcia about 0·15 to 0·17 mm.

Habitat.—Station 315, lat. 51° 40′ S., long. 57° 50′ W., 12 fathoms, sand and gravel.

[Northern coast of Britain; Shetland; Ireland; Greenland, Fabricius; Davis Strait,

100 fathoms; Gulf of St. Lawrence; Spitzbergen; West of Nova Zembla, lat. 72° 30′ N., long. 52° 45′ E., 5 to 20 fathoms, Stuxberg and Théel; Roscoff, Joliet; Port Jackson, Haswell.]

Distinguished from the preceding species, as above observed, by the tubular portions of the zoœcia being punctate up to the border of the orifice, and their rather larger size. There can, I now think, be no doubt as to the distinctness of the two species.

Family IV. Diastoporidæ, Busk.

Diastoporidæ (pars), Bk., Crag Polyzoa, p. 113, Smitt.
Tubuliporidæ (pars), Hincks, &c.

Character.—Zoarium crustaceous or foliaceous, discoid or of indefinite outline; adnate and sessile, or pedunculate and erect; no interstitial cancelli.

The Family here contains:—

1. *Diastopora*, Johnston.
   (1) *Diastopora patina.*

1. *Diastopora*, Johnston.

"*Diastopores simples*," M.-Edwards, Réch. sur les Crisies, p. 39.
Diastopora, Johnst., Bk., Crag Polyzoa, p. 113; Brit. Mus. Cat., pt. iii., p. 28; Hincks, Brit. Mar. Polyz., p. 457.
Diastopora (pars), Lamx., M.-Edwards, Blainville, Reuss, Hagenow, Michelin, d'Orbigny, Smitt.
Tubulipora sp., Johnst., Auctt.
Berenicea (pars), Lamx., d'Orbigny.
Patinella, Gray, Hincks, Zooph. S. Devon, Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 468.

Character.—Zoarium adnate, discoid or flabelliform, centric or excentric; outline lobed or entire. Zoœcia towards the centre wholly immersed, usually sub-erect and partially free towards the periphery; orifice orbicular or elliptical; horizontal or oblique.

(1) *Diastopora patina*, Lamarck (sp.).

Tubulipora patina, Lamk., Johnst., Gosse, Mar. Zool., pt. iii., p. 8, fig. 1 (*nec* Milne-Edwards); Joliet.
? *Patinella verrucaria*, Gray.
Patinella patina, Hincks, Zooph. S. Devon, Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 468.
Diastopora patina, Smitt., Busk, Brit. Mus. Cat., pt. iii., p. 28, pl. xxix. figs. 1, 2, pl. xxx. fig. 1; Hincks, Brit. Mar. Polyz., vol. i. p. 458, pl. lxvi. figs. 1–6; Waters.
? *Discosparsa marginata* (pars), d'Orbigny.
Discosparsa patina, Heller, Marion.

Character.—Zoarium when mature, discoid, circular, cupped, and bordered by a thin expansion. Central zoœcia immersed and usually occluded; marginal ones erect and

open, usually disposed in irregular wavy lines radiating from the centre. (Sometimes gemmiparous, Hincks).

Habitat.—Off Nightingale Island, Tristan da Cunha, 100 to 150 fathoms.

[British and Irish Coasts, northern and southern; North Sea, Arctic Ocean, 5 to 10 fathoms, on Fucus, Flustra, &c., and on shells and coral from 50 to 100 fathoms, Smitt; coast of Norway, Lovén; Shetland, Barlee, 170 fathoms; Adriatic, Heller; South Labrador; Marseilles, Marion; Roscoff, Joliet.]

Family V. Lichenoporidæ.

Lichenoporidæ, Smitt, Hincks, &c.
Discoporadæ, Bk., Engl. Cyclop.
Caveidæ (pars), d'Orbigny.
Tubigeridæ (pars), d'Orbigny.
Discoporellidæ, Bk., Brit. Mus. Cat., pt. iii. p. 30, 1875.

Character.—Zoarium discoid, simple or confluent; adnate or substipitate, interzoœcial spaces cancellate (cancelli sometimes obsolete). Zoœcia erect or suberect, disposed more or less regularly in series diverging from an open central area.

The Family here contains:—

1. *Lichenopora.*

   (1) *Lichenopora fimbriata*, Bk.
   (2) *Lichenopora hispida*, Flem.

1. *Lichenopora*, Defrance.

Madrepora (pars), Fabr., Esper.
Lichenopora, Defrance (1823), Blainville, Michelin, Smitt (1878), Hincks, Brit. Mar. Polyz., p. 471.
Discoporella, Gray, Brit. Mar. Rad.; Busk, Crag Polyzoa, and Brit. Mus. Cat., pt. iii. p. 30; Smitt, Kritisk Förteckn., p. 405 (1865).
Discopora (pars), Flem. (*non* Lamk.), Busk, Engl. Cyclop. Polyz.
Tubulipora (pars), Johnst., M.-Edw., &c.
Defrancia (pars), *Actinopora*, *Discocavea*, *Unicavea*, &c., d'Orb.
Heteroporella sp., Hincks.

Character.—Zoarium sessile, usually closely adnate, with a thin calcareous border; discoid, raised in the centre (hemispherical, conical, or subconical). Zoœcia partly free, disposed irregularly or in lines radiating from the centre. Mouth acuminate or toothed.

(1) *Lichenopora fimbriata*, Busk.

Discoporella fimbriata, Bk., Brit. Mus. Cat., pt. iii. p. 32, pl. xxvii.

Character.—Zoarium subconical or hemispherical; zoœcia indistinctly serial, distant; interstitial cancelli or pores small, circular, often more or less obsolete; orifice somewhat expanding; peristome fimbriate, with a variable number of pointed teeth.

Habitat.—Off Nightingale Island, Tristan da Cunha, 100 to 150 fathoms.

[Chonos Archipelago, 13 fathoms; Tierra del Fuego, Cape Horn, 40 fathoms; Chiloe, 96 fathoms, Darwin; Tasmania, Mr. Smith.]

(2) *Lichenopora hispida*, Fleming (sp.).

Discopora hispida, Fleming, Blainville, Couch.
Tubulipora hispida, Johnst.
Discoporella hispida, Gray; Busk, Crag Polyzoa, p. 115, pl. xviii. fig. 5; Brit. Mus. Cat., pt. iii. p. 30, pl. xxx. fig. 3; Smitt, Sars, Alder, &c.
Heteroporella radiata, Bk., Crag Polyzoa, p. 127, pl. xix. fig. 2.
Heteroporella hispida, Hincks, Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 469.
Lichenopora hispida, Hincks, Brit. Mar. Polyz., p. 473, pl. lxviii. figs. 1–8.

Character.—Zoarium suborbicular, convex, with or without a narrow marginal lamina; surface uniformly covered with circular openings level with the surface, of tolerably uniform size; towards the border some of the orifices raised, subtubular, and bi- or tridenticulate, disposed in obscure irregular series.

Habitat.—Stations 135 to 135G, Tristan da Cunha, 100 to 1100 fathoms.

[British Coasts, north and south; Northern Seas, Greenland, Labrador, &c. (fossil, Coral Crag; Post Pliocene, Canada).]

Family VI. Frondiporidæ, Smitt.

Fasciculinea (pars), d'Orbigny, Smitt, 1866.
Fascigeridæ (pars), d'Orbigny.
Frondiporidæ, Smitt, Kritisk Förteckn., pp. 407, 408 (1866); Busk, Brit. Mus. Cat., pt. iii. p. 37.
Cerioporidæ (pars), Busk, Crag Polyzoa, p. 118.
Cerioporinæ (pars), Hagenow.

Character.—Zoarium massive, stipitate, simple or lobate, or ramose. Zoœcia connate throughout, aggregated into fasciculi; lumen of tubes angular; walls finely porous; sides of lobes or fasciculi faintly striated or subporcellanous; no intermediate pores or cancelli.

The Family here contains :—

1. *Fasciculipora*, d'Orb.

(1) *Fasciculipora ramosa*, d'Orb.

2. *Supercytis*, d'Orb.

(1) *Supercytis digitata*, d'Orb. (Pl. V. fig. 3).
(2) *Supercytis tubigera*, n. sp. (Pl. V. fig. 4).

1. *Fasciculipora*, d'Orb.

Fasciculipora, d'Orb. (1839), Busk, Brit. Mus. Cat., pt. iii. p. 37 (pars).
Frondipora, Michelin (pars); Hagenow.
Corymbopora (pars), Michelin.
Corymbosa, sp., d'Orbigny.
Fungella, Hagenow, Bk., Crag Polyzoa, p. 118.

Character.—Zoarium stipitate; capitulum lobate. Zoœcia opening only at the ends of the fasciculi.

(1) *Fasciculipora ramosa*, d'Orbigny.

Fasciculipora ramosa, d'Orb., Voy. Amér. Mérid., Polypiers, p. 20, pl. ix. figs. 22–24.
? *Frondipora ramosa*, Hagenow.
Corymbosa ramosa, d'Orb., Cours Elém. de Pal., tom. ii. p. 109, 1851.
? *Fungella prolifer*, Hagenow, Maast. Kreid., p. 37, pl. iii. figs. 6, 7 (?).

Character.—Zoarium fungiform; capitulum composed of numerous obtuse, rounded lobes (usually in pairs); each lobe constituted of a thick fasciculus of tubular cells of large calibre and very thin walls, with a few intermediate tubes of less diameter interspersed; outer surface smooth, dotted obscurely, showing the outline of the elongated zoœcia, or thickened and porcellanous.

Habitat.—Off Inaccessible and Nightingale Islands, Tristan da Cunha, 60 to 150 fathoms.

[South Patagonia, 48 fathoms, Darwin, d'Orbigny.]

Fasciculipora ramosa bears a close resemblance to *Fungella multifida*, mihi, of the Crag (pl. xvii. fig. 4), but in that species, which probably corresponds with *Frondipora marsilli* of Michelin (Iconog., p. 68, pl. xiv. fig. 4). The whole growth appears more squat or depressed, and the lobes shorter and not in pairs, whilst the outer surface towards the base is marked with hexagonal areolæ, an appearance not seen in *Fasciculipora ramosa*. Otherwise the two forms appear to be closely allied.

2. *Supercytis*, d'Orbigny.

Supercytis, d'Orbigny, Palæont. Franç., p. 1060; Waters, Quart. Journ. Geol. Soc., vol. xl., 1884, p. 692.
Fasciculipora (pars), d'Orbigny; Busk, Brit. Mus. Cat., pt. iii. p. 37.

Character.—Zoarium stipitate; capitulum expanded, flat or cupped, with numerous furcate or trifid fasciculi projecting round the border. Fasciculi compressed, constituted of coalesced, almost completely immersed zoœcia of varying lengths, all of which open on the upper flattened side of the fasciculus or at the extremity. Dorsal surface rounded, even, longitudinally striated and minutely punctate. Oœcia (when present) hemispherical, at the base of the fasciculi, and usually on the upper surface.

It is not easy to assign its proper family place to this peculiar type, but on the whole it would perhaps be more at home among the Fasciculinæ or Frondiporidæ, than elsewhere, the main difference between it and the other members of the group consisting in the openings of the zoœcia not being altogether terminal but partly on the upper side of the lobes or lateral fasciculi, or more rarely on the central area of the capitulum, which in one of the forms here described, in the perfect and perhaps more or less immature state, is covered with an even, calcareous, minutely punctate lamina, marked out into very regular hexagonal areolæ, from some of which, towards the border, may be seen the slightly projecting orifices of zoœcia. In the second species the hexagonal areolation is apparently wanting, and in this form a few long tubular zoœcia project at the base of some of the fasciculate lobes.

In the British Museum Catalogue I have described and figured, under the name of *Fasciculipora digitata*, a species, which as pointed out by Mr. Waters (*loc. cit.*, p. 692), is in all probability identical with M. d'Orbigny's *Supercytis digitata*, but in that specimen, which was a good deal worn, the hexagonally areolated, calcareous lamina of the central area is absent, and nothing is seen but the open orifices of what might be taken for the interstitial cancelli characteristic of the Lichenoporidan group. There can, however, I think, be no doubt that they represent the orifices of stunted or undeveloped zoœcia, because, firstly, towards the base of the digitiform lateral fasciculi many of the areolæ are actually developed into short zoœcial tubes; and secondly, in none can be traced a vestige of the internal ciliary processes which are seen almost universally in true interstitial cancelli. Besides these marginal stunted zoœcia, there may be seen in all parts of the central area similar projecting orifices, which are described by Mr. Waters as the ends of central zoœcia slightly exserted, and which, as he remarks, give this portion the aspect of a *Diastopora*, such as *Diastopora sarniensis*.

(1) *Supercytis digitata*, d'Orbigny (Pl. V. fig. 3).

Supercytis digitata, d'Orb., Palæont. Franç., p. 1061, pl. dccxcviii. figs. 6–9; Waters, *loc. cit.*, p. 692, pl. xxxi. figs. 22, 26, 27.
Fasciculipora digitata, Bk., *loc. cit.*, p. 37, pl. xxxiii. fig. 1.

Character.—Zoarium oblong, 0·12 × 0·8 mm.; the stipitate capitulum flattened above, presents a large central area covered with a hexagonally areolated lamina, and from the sides project twelve digitate, forked, or sometimes trifid compressed lobes, composed of longer or shorter tubular zoœcia, about 0·2 mm. in diameter, almost completely immersed or sometimes slightly projecting, and opening throughout the whole length of the lobe on its upper flattened aspect, and some from the areolæ of the central area. Dorsal aspect of the lobes rounded, even, longitudinally striated and minutely punctate. Oœcia?

Habitat.—Station 167, lat. 39° 32′ S., long. 171° 48′ E., 150 fathoms, blue mud.

[Cape Capricorn, Australia, H.M.S. "Rattlesnake." Fossil, Cretaceous, Meudon, &c., d'Orbigny; South Australia, Waters.]

(2) *Supercytis tubigera*, n. sp. (?) (Pl. V. fig. 4).

Character.—Zoarium stipitate, capitulate; capitulum irregular or inequilateral; central area small, not areolated, but covered with a thickish calcareous lamina, with concentric rugæ, giving it a conchoidal aspect; ten or twelve marginal fasciculate or digitate bi- or trifurcate compressed processes, in which the zoœcia are disposed more or less regularly in series of connate tubes, opening either at the extremity of the fasciculus or on its upper flattened aspect; at the base of some of the fasciculi a few much elongated tubular zoœcia arise nearly vertically, with punctate walls, and about 0·25 mm. in diameter. Dorsal surface of fasciculi and capitulum striated and minutely punctate. Oœcia in the form of hemispherical projections at the base of the lateral fasciculi and usually on the upper aspect.

Habitat.—Station 151, off Heard Island, 75 fathoms, volcanic mud.

As the collection affords only a single specimen, which conveys the impression of a somewhat distorted growth, it may, perhaps, be merely a variety of the preceding. But the absence of areolation of the central area of the capitulum and the presence of the much elongated tubular zoœcia, together with the occurrence of the hemispherical oœcia, appeared to me to justify its being considered specifically distinct.

Sub-Order III. CTENOSTOMATA, Busk.

Ctenostomata, Busk, Hincks, Smitt, Auctt.
Halcyonellea and *Vesicularina*, Johnst.

Character.—Zoœcial orifice simply circular, bilabiate (?) or quadrangular; retractile; border contractile, furnished with a setose or membranous fringe or velum. Zoarium corneous or membranaceous, or carnose; never calcified. No marsupial or appendicular organs.

Division I.—HALCYONELLEA.

Halcyonellea, Ehrenberg, Hincks.
Polyzoa carnosa, Gray.
Alcyonidulæ, Johnst.
Halcyonelleæ, Smitt.

Character.—Zoarium membranous or carnose, or semigelatinous, developed by continuous gemmation of the zoœcia from each other.

This division, embracing in Mr. Hincks' classification the genera

Alcyonidium,
Flustrella,
Arachnidium,

is represented in the Challenger collection by a single species referable to *Alcyonidium*.

Family I. Alcyonidulæ.

Alcyonidulæ, Couch.
Halcyonelleæ, Smitt.
Alcyonidiidæ, Hincks.

Character.—Zoœcia more or less closely united, immersed in an expanded and adherent gelatinous crust, or forming an erect, cylindrical or compressed zoarium; orifice closed by the invagination of the tentacular sheath.

The Family here contains:—

1. *Alcyonidium*, Lamouroux.

(1) *Alcyonidium flustroides*, n. sp. (Pl. X. figs. 13, 14).

1. *Alcyonidium.*

Alcyonidium, Lamx., Johnst., Couch, Busk, Engl. Cyclop., art. Polyz.; Hincks, &c.
Alcyonium (pars), Linné, Pallas, Müller, Fleming, &c.
Halodactylus, Farre, v. Beneden.
Cycloum and *Sarchochitum*, Hassall.

Character.—Zoœcia immersed or subimmersed. Orifice usually papillæform, more or less exsertile. Zoarium erect and lobate or crustaceous or repent.

(1) *Alcyonidium flustroides*, n. sp. (Pl. X. figs. 13, 14).

Character.—Zoarium erect and foliaceous, much branched, extending to 4 or 5 inches; bilaminate, compressed and flustroid. Zoœcia polygonal, arranged in irregular longitudinal series, the septa between which are raised and strongly marked. The substance of the walls semigelatinous, irregularly dotted with small black granules. Orifice minute, papillæform, superior. Polypide with about sixteen tentacles. Ova scattered, usually singly, in the zoœcia. Width of branches about 4 mm.; zoœcia irregular in size, from about $0{\cdot}8 \times 0{\cdot}4$ mm. to $1{\cdot}6 \times 0{\cdot}6$ mm.

Habitat.—Station 142, lat. 35° 4′ S., long. 18° 37′ E., 150 fathoms, green sand.

This species forms straggling tufts of loosely entwined and sometimes anastomosing branches, which are quite soft and flexible in the upper part, though the stem and lower branches become hard and firm near the base. Sometimes the branches embrace and adhere firmly to some foreign substance, such as worm tubes, &c. The structure is at first sight very obscure, as the substance is very thick and opaque; immersion for a short time in acid, however, renders it much more transparent and enables the nature of the zoœcia to be seen. Many of these contain polypides alone, others polypides and ova together, and others again either "brown bodies" or scattered ova only. The orifices are very small and often quite obscure. The walls seem to be partly membranous and partly of a semigelatinous nature, irregularly dotted with small black granules which are possibly argillaceous. In the form of the cell and the raised septa this species resembles *Alcyonidium mytili*, as described by Mr. Hincks,[1] but entirely differs from that form in its erect bilaminate mode of growth.

[1] Brit. Mar. Polyz., p. 498, pl. lxx. figs. 2, 3.

Division II.—VESICULARINA.

Vesicularina (pars), Johnst.
Stolonifera, Ehlers, Hincks.
Les centrifuginés radicellés (pars), d'Orb.
Vesiculariea, Smitt.

Character.—Zoarium corneous, developed by the continuous segmentation of a branching stem or stolon, having a transverse diaphragm at each node. Zoœcia budding directly from the internodes and not from each other.

Family II. Vesicularidæ.

Vesiculariadæ, Johnst., Alder, &c.
Vesiculariidæ and *Valkeriidæ*, Hincks.
Vesiculariæ, Smitt.

Character.—Zoarium erect, free and ramose or radicate, repent or stoloniferous. Zoœcia deciduous or readily detached, leaving a circular area filled in by a perforated diaphragm. Wall entire all round, without any membranous area.

The Family here contains the following genera :—

1. *Amathia*, Lamouroux.

   (1) *Amathia lendigera*, Linn.
   (2) *Amathia distans*, n. sp. (Pl. VII. fig. 1).
   (3) *Amathia brasiliensis*, n. sp. (Pl. VII. fig. 2).
   (4) *Amathia spiralis*, Lamx. (Pl. VI. fig. 2).
   (5) *Amathia tortuosa*, Woods (Pl. VI. fig. 1).
   (6) *Amathia connexa*, n. sp. (Pl. VI. fig. 3).
   (7) *Amathia semispiralis*, Kirchenpauer (Pl. VIII. fig. 3).

2. *Vesicularia*, J. V. Thompson.

   (1) *Vesicularia papuensis*, n. sp. (Pl. VIII. fig. 1).
   (2) *Vesicularia trichotoma*, n. sp. (Pl. VIII. fig. 4).

3. *Farrella*, Ehrenburg.

   (1) *Farrella* ~~*brasiliensis*~~ *atlantica*, n. sp. (Pl. VII. fig. 3).

1. *Amathia*, Lamouroux.

Sertularia (pars), Linn.
Amathia, Lamx., d'Orbigny (pars); Kraus, Heller, Hincks, &c.
Serialaria, Lamk., Fleming, Johnst., Blainville, Kirchenpauer, d'Orbigny (pars), Busk, Engl. Cyclop., art. Polyz.; Joliet, Barrois, &c.
Valkeria (pars), Dalyell.

Character.—Zoarium radicate, erect or creeping, with free dichotomous branches. Zoœcia cylindrical or subovoid, with a broad adherent base, and more or less connate laterally; arranged alternately in a double series, disposed spirally, entirely or partially surrounding the internodes, or in a straight line parallel with the axis, or in short distant groups at the upper ends of the internodes.

(1) *Amathia lendigera*, Linné (sp.).

"Nit Coralline," Ellis.
Sertularia lendigera, Linné, Pallas, Ellis and Sol., Lister.
La Sertolara lendinosa, Cavolini.
Amathia lendigera, Lamx., Pol. flex., p. 159; Heller, Hincks, Brit. Mar. Polyz., p. 516, pl. lxxiv. figs. 7–10, &c.
Serialaria lendigera, Lamk, Auctt.
Valkeria lendigera, Dalyell.

Character.—Zoarium much branched, tangled, filamentous; branches dichotomous, about 0·5 × 0·15 mm. Zoœcia subcylindrical, ovate, subcompressed, tapering gradually in a long neck, disposed obliquely in series of four to five pairs close below each joint or bifurcation, and gradually diminishing in length from below upwards. Cells subdistinct, and scarcely connate.

Habitat.—Station 36, off Bermuda, 30 fathoms, coral.

[British and European Seas, *ubique.*]

(2) *Amathia distans*, n. sp. (Pl. VII. fig. 1).

Character.—Zoarium very slender and delicate, straggling, filamentous, very regularly dichotomous. Internodes long, straight, rigid, thick-walled, about 0·15 mm. in diameter, of pretty uniform length, and each completely encircled with a spiral coil, occupying usually not more than the upper half of the internode, the lower portion of which is left bare. Zoœcia ovoid or oblong, about 0·4 or 0·5 mm. by 0·1 to 0·15 mm., distinct or not closely connate, with a short conical neck.

Habitat.—Off Bahia, 10 to 20 fathoms, mud.

This form is at once recognisable by its delicate filamentous growth, and the great distance between the spiral coils, giving it somewhat the aspect of *Amathia lendigera*. Another character is the comparative shortness and distinctness of the zoœcia.

(3) *Amathia brasiliensis*, n. sp. (Pl. VII. fig. 2).

Character.—Zoarium several inches high (?), irregularly branched; branches frequently terminating in two long jointed filaments, which occasionally throw out one or two isolated zoœcia or stunted branches at the nodes. The branches sometimes also commence with two or three barren internodes. Stems about 0·3 mm. in diameter, wall white and delicate. Zoœcia disposed in a more or less complete spiral, which in the younger internodes occupies only the upper part, but in the older nearly their entire length; very distinct, subcylindrical, tapering from the base upwards, about 0·6 × 0·1 mm.; neck long and slender.

Habitat.—Off Bahia, 10 to 20 fathoms, mud.

The striking peculiarity of this form is the tendency of the branches to terminate in two long jointed tags (terminals), usually barren, but sometimes giving off one or two scattered isolated cells in the manner of some of the Vesiculariæ, &c. The comparative distinctness of the zoœcia in the spiral series shows a tendency in the same direction.

(4) *Amathia spiralis*, Lamouroux (Pl. VI. fig. 2).

Amathia spiralis, Lamx., Polyp. Flex., p. 161, pl. iv. fig. 2.; Expos., p. 10, pl. lxv. figs. 16–17; Encyclop., p. 44.
Serialaria convoluta, Lamarck, Schweigger.
? *Serialaria spiralis*, Woods, Proc. Roy. Soc. N.S.W., vol. xi. p. 84, 1877.
? *Amathia bicornis*, Woods, Trans. Roy. Soc. Vict., vol. xvi. p. 102, 1880.

Character.—Zoarium very thick, branched subdichotomously or irregularly, several inches high. Zoœcia subcylindrical, of uniform diameter, very closely connate, 1·0 mm. long, by 0·2 mm. in diameter (at base); the exserted neck thick and very strongly wrinkled; transversely disposed in an apparently continuous spiral from one internode to another, though in reality probably discontinuous at each internode.

Habitat.—Station 161, off entrance to Port Philip, 33 fathoms, sand. Station 162, off East Moncœur Island, Bass Strait, 38 fathoms, sand and shells. Station 163A, off Twofold Bay, 150 fathoms, green mud.

[Bass Strait and Australia, *ubique* (?), Lamx., &c.]

(5) *Amathia tortuosa*, Woods, (Pl. VI. fig. 1).

? *Amathia tortuosa*, Woods, Proc. Roy. Soc. Vict., vol. xvi. p. 89, fig. 6.

Character.—Zoarium 3, 4 or 5 inches high, in thick tufts, when spread out; divaricate, with long subalternate branches; rooted by radical fibres. Dull olive green colour. Stem 0·5 to 0·6 mm. in diameter. Zoœcia slender, about 1 mm. × 0·15 to 0·2 mm., disposed spirally round the internodes, but not always forming quite one turn.

Habitat.—Station 163A, off Twofold Bay, 150 fathoms, green mud.
[Australia, J. T. Woods.]

It appears to me very doubtful whether this is really the form so named by Mr. Woods, who may probably not have distinguished it from the next species, which in its general habit seems to resemble the figure of his *Amathia tortuosa* more than the present. However, I am led to suppose that he had this one in view from his remark respecting the great length of the cells, which in my *Amathia connexa* are rather short. What Mr. Woods intends by "a crescentic mouth, without setæ or spines," I do not clearly understand; and it should moreover be remarked, that in his figure of *Amathia tortuosa* the cells are not represented by any means as unusually long.

(6) *Amathia connexa*, n. sp. (Pl. VI. fig. 3).

Character.—Zoarium 3 to 4 inches high, very irregularly branched, straggling, forming dense tufts. Stem and branches from 0·5 to 0·6 mm. in diameter, transparent as glass, each internode encircled with a spiral series of zoœcia not extending its entire length, but leaving a space at each end clear. Branches here and there connected by transverse barren tubes. Zoœcia oblong, 0·5 × 0·13 mm., abruptly rounded (the neck projecting about 0·2 mm.), connivent, very delicate walls, so that the outlines towards the summits are very indistinct.

Habitat.—Station 186, off Cape York, 8 fathoms, coral mud.

The main characteristics of this form consist in—

1. The comparatively large diameter of the segmented stems and the beautiful glassy transparency of their walls, upon which the encircling series of zoœcia appear to stand out in strong relief, so as at first sight to seem as if they were disposed on one side only of the segment; but examination shows that in reality they form nearly or wholly complete circles round the stem.

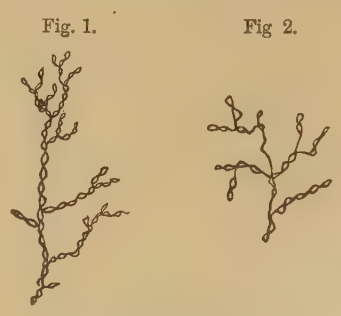


Fig. 1.—*Amathia connexa.*
Fig. 2.—*Amathia tortuosa*, Woods.

2. A second very striking feature, that I have not noticed in any other species of *Amathia*, is the occasional connection of the branches by transverse, barren, segmented tubes, resembling a similar arrangement in some of the Cheilostomata. As observed in the description of the preceding species, the general habit of *Amathia connexa* closely resembles that of Mr. Woods' *Amathia tortuosa*, as shown in his figure, which is copied in the accompanying woodcut. But that *Amathia connexa* should be the species intended by him under the name *tortuosa* is contradicted, as has been remarked, by the comparative shortness of the zoœcia.

(7) *Amathia semispiralis*, Kirchenpauer (sp.) (Pl. VIII. fig. 3).

Serialaria semispiralis, Kirchenpauer, Cat. Mus. Godeffroy, vol. iv. p. xxxiv., 1869.

Character.—Zoarium filamentous, dichotomous; stem brownish, about 0·3 mm. in diameter. Zoœcia disposed in short series, composed of four to eight pairs of cells; series distant, placed obliquely, three or four in each internode; zoœcia slender, cylindrical or somewhat quadrangular in form, about 0·6 to 0·7 × 0·15 mm., obtuse and strongly wrinkled transversely at the closed end; neck very short, and setæ short.

Habitat.—Station 188, lat. 9° 59′ S., long. 139° 42′ E., 28 fathoms, green mud.

[Samoa, Kirchenpauer.]

It may be doubtful whether this form is really that intended by Kirchenpauer, who (*loc. cit.*) describes the zoarium as "dichotomously branched. The cells dispersed in biserial groups, at certain distances apart, and spirally round the stem; each spiral, however, extending only about one-half round the axis. From *Serialaria semiconvoluta*, Lamk., it differs in the character that in that species the tubular cells form much longer rows, whilst it also has an entirely different habit." How M. Kirchenpauer can bring it at all in comparison with the *Serialaria continhii*, which in habit more resembles a Mimosella, is more than I can imagine. No two things would appear to be more distinct.

2. *Vesicularia*, Thompson.

Vesicularia, J. V. Thompson (pars); Farre, Johnst. Busk, Engl. Cyclop.; Hincks, Brit. Mar. Polyz., p. 512, &c.
Sertularia (pars), Linné, Pallas, &c.
Laomedea (pars), Lamx., Blainville.
Valkeria (pars), Fleming.

Character.—Zoarium erect, radicate, or rooted by a fibrous base. Zoœcia distinct, usually distant, disposed in a single row or alternately in two rows on one face only of the stems. (Polypides with a gizzard, Hincks).

(1) *Vesicularia papuensis*, n. sp. (Pl. VIII. fig. 1).

Character.—Zoarium about $\frac{3}{4}$ inch high, very delicate, branching dichotomously in one plane, at an acute angle, rooted by short radical fibres. Branches composed of three or four internodes, about 0·15 mm. in diameter, and each supporting on one face a double row of zoœcia disposed alternately on each side. Zoœcia ovate, 0·5 × 0·15 mm. (with the neck retracted); neck thick and rather bulbous; surface generally smooth. No gizzard.

Habitat.—Station 188, lat. 9° 59′ S., long. 139° 42′ E., 28 fathoms, green mud.

The distinction between this form and *Vesicularia spinosa* is too obvious to require remark. But there is a second species, which occurred in the "Rattlesnake" collection, and was procured between Cumberland Island and Point Slade, which appears to be very closely allied, and I have, therefore, thought it might be useful to give a description of it, though not strictly belonging to the Challenger Expedition.

(2) *Vesicularia trichotoma* (Pl. VIII. fig. 4).

Character.—Zoarium of irregular straggling growth, main stems or primary branches about 0·2 in diameter, and usually barren, thick-walled. Primary branching, trichotomous, secondary usually furcate. Secondary and tertiary branches much slenderer, thin-walled. The internodes support eight to ten zoœcia, disposed alternately in a double series on only one side of the branch; in the youngest segments there is only a single row. Zoœcia very readily detached, ovoid, and about 0·4 × 0·2 mm. The surface is smooth and the neck short.

Habitat.—Bass Strait, between Cumberland Island and Point Slade, Voyage of H.M.S. "Rattlesnake."[1]

A peculiarity at once distinctive of this form is the trichotomous division of the primary branches; the great difference in diameter of the branches is also characteristic, as distinguishing it from the preceding, with which it agrees in the alternate arrangement of the zoœcia on the internodes.

2. *Farrella*, Ehrenburg.

Farrella, Ehrenb., Johnst., Busk, Engl. Cyclop.; Hincks, Brit. Mar. Polyz., p. 528, &c.
Lagenella, Farre, W. Thomson, Hassall.
Laguncula, Van Beneden.

Character.—Zoarium stolonate, free, or creeping and adherent; branching irregularly or at definite intervals. Zoœcia cylindrical or subventricose below, pedunculate. Orifice, when the neck (goulot) is retracted, bilabiate or quadrangular. Neck long, tapering, with or without a crown of setæ.[2] (No gizzard).

(1) *Farrella atlantica*, n. sp. (Pl. VII. fig. 3).

Character.—Zoarium stolonate, filamentous, jointed at regular intervals, free or creeping and adnate. Stolon 0·02 to 0·04 mm. in diameter, throwing out three or four short branches or zoœcia close below each joint at regular intervals. Zoœcia with the

[1] This species does not occur in the Challenger collection.

[2] It does not seem to have hitherto been remarked that the genus *Laguncula* (V. B.), as exemplified in *Laguncula repsus* and *Laguncula elongata*, has no setæ.

neck retracted, about 0·4 mm. long by 0·07 to 0·09 in diameter, cylindrical and of uniform diameter throughout, quadrangular at the orifice when the neck is retracted. Supported on a long peduncle. Surface of peduncle and lower part of cells very finely wrinkled.

Habitat.—Off Bahia, 10 to 20 fathoms, mud. On *Amathia brasiliensis* and *Amathia distans.*

Family III. Cylindrœcidæ.

Cylindrœciidæ, Hincks, Brit. Mar. Polyz., p. 534.
Vesiculariadæ (pars), Bk., Alder, Hincks.
Vesicularieæ (pars), Smitt.

Character.—Zoœcia not deciduous, arising from, and apparently continuous with, the stolon or segment from which they spring. Walls earthy or argillaceous.

The Family here contains the following :—

1. *Cylindrœcium*, Hincks.

(1) *Cylindrœcium papuense* (Pl. VIII. fig. 2).

1. *Cylindrœcium*, Hincks.

Farrella (pars), Bk.
Avenella, Hincks, Gosse (*nec* Dalyell).
Cylindrœcium, Hincks, Brit. Mar. Polyz., p. 535.
Vesicularia (subg. *Avenella*, pars), Smitt.

Character.—Zoœcia uniformly cylindrical or slightly ventricose below, sometimes dilated at the base. Stolon slender, creeping, with occasional enlargements. Zoœcia wide apart or sometimes crowded.

(1) *Cylindrœcium papuense*, n. sp. (Pl. VIII. fig. 2).

Character.—Zoarium a creeping adherent stolon with occasional bulbous thickenings. Zoœcia cylindrical, of uniform diameter and not dilated at the base, 1·3 mm. long by 0·1 to 0·11 mm. in diameter, springing either singly and widely apart from the stolon, or four or five together from a bulbous thickening.

Habitat.—Station 188, lat. 9° 59′ S., long. 139° 42′ E., 28 fathoms, green mud. Parasitic on *Amathia semispiralis*, Kirchenp.

The forms known to me as referable to the genus *Cylindrœcium* as above defined are :—

(1) *Cylindrœcium giganteum*, Busk.

Farrella gigantea, Bk., Quart. Journ. Micr. Sci., vol. iv. p. 93, pl. v. figs. 1, 2; Gosse, Mar. Zool., pt. ii. p. 22, fig. 40.
Avenella gigantea, Hincks, Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 473.
Avenella fusca (*forma producta*), Smitt, Kritisk Förteckn., p. 503.
Cylindrœcium giganteum, Hincks, Brit. Mar. Polyz., p. 535, pl. lxxvii. figs. 3, 4.

(2) *Cylindrœcium dilatatum*, Hincks.

Farrella dilatata, Hincks, Quart. Journ. Micr. Sci., vol. viii. p. 279, pl. xxx. fig. 7.
Avenella dilatata, Hincks, Ann. and Mag. Nat. Hist., ser. 3, vol. ix. p. 473.
Cylindrœcium dilatatum (pars), Hincks, Brit. Mar. Polyz., p. 536, pl. lxxix. figs. 1–3.

(3) *Cylindrœcium fuscum*, Busk.

Farrella fusca, Bk., Quart. Journ. Micr. Sci., vol. iv. p. 94, pl. vi. fig. 3.
Avenella fusca, Alder, North. Cat., p. 69; ? Norman, Shetland Polyz., Rep. Brit. Assoc., 1868, p. 311; Smitt (*forma simplex*), Kritisk Förteckn., p. 503.
Cylindrœcium dilatatum (pars), Hincks, Brit. Mar. Polyz., p. 537, pl. lxxvii. figs. 1, 2.

(4) *Cylindrœcium pusillum*, Hincks.

Cylindrœcium pusillum, Hincks, *loc. cit.*, p. 537, pl. lxxx. fig. 8.

(5) *Cylindrœcium pusillum*, var. "*dwarf*," Hincks.

Cylindrœcium pusillum, var. "*dwarf*," Hincks, *loc. cit.*, p. 538, pl. lxxx. fig. 9.

(6) *Cylindrœcium papuense*, n. sp.

The respective dimensions of the zoœcia in these species, so far as they can be made out (mostly from Mr. Hincks's careful figures), are as follows, given in millimetres:—

	Length.		Breadth.
1. *Cylindrœcium giganteum*,	3·5	×	0·20–0·25
2. *Cylindrœcium dilatatum*,	0·9	×	0·13
3. *Cylindrœcium fuscum*,	1·7	×	0·2–0·3
4. *Cylindrœcium pusillum*,	1·3	×	0·10–0·13
5. *Cylindrœcium pusillum*, var.,	0·7	×	0·1
6. *Cylindrœcium papuense*,	1·3	×	0·10–·11

From these dimensions it would seem that the form most nearly approaching that in the Challenger collection is the one named *Cylindrœcium pusillum* by Mr. Hincks; from this, however, it differs in the uniform diameter of the zoœcia, which in the latter become wider or subventricose below.

I may take this opportunity of remarking that the form named *Farella fusca* by me, from specimens collected at Newhaven, Firth of Forth, by Mr. W. Thompson in 1849, and which is considered by Mr. Hincks synonymous with his *Cylindrœcium dilatatum*,

seems to differ so much in its comparative dimensions as perhaps to deserve recognition as a distinct species, which might be named *Cylindrœcium fuscum*, as being the first of the genus to which that appellative was given.

Group B. **ENTOPROCTA**, Nitsche.

Entoprocta, Nitsche, Zeitschr. f. wiss. Zool., Bd. xx. p. 34; Hincks, Brit. Mar. Polyz., p. 563.

Character.—Both oral and anal orifices lying within the crown of tentacles; no tentacular sheath. Tentacles contractile but not retractile, arranged bilaterally and symmetrically.

Order **PEDICELLINEA.**

The only order.

Family I. Pedicellinidæ, Hincks.

Polypiaria pedicellinea, Gervais, 1837.
Pedicellinæ, Johnst.
Pedicellinidæ, Smitt, 1867; Hincks, 1880; Jullien, 1885

Character.—Polypides deciduous, borne on a more or less muscular, rigid or contractile peduncle; united into colonies by a chitinous ramified stem or stolon.

The general characters of the family Pedicellinidæ are so well and succinctly given by Mr. Hincks[1] as scarcely to require further observation. The chief points to be noticed, as he remarks, besides the Entoproctous anal orifice are—

1. That there is no invagination of the anterior region and therefore no tentacular sheath, and consequently an absence of the retractor muscular fibres by which it is retracted in the Ectoproctæ.

2. That the integument is soft and never calcified, and is closely applied to its contents; *i.e.*, there is no perivisceral cavity containing a fluid as in most other Polyzoa, such small space as there is between the inner wall of the calyx and the contained organs is occupied by a more or less delicate parenchymatous tissue. The integument is composed of a very delicate outer membrane lined by a layer of flattened polygonal cells. The outer membrane or ectocyst is prolonged beyond the visceral mass and forms the side of the vestibular cup-like chamber, within the transparent walls of which the tentacles are usually seen coiled. The tentacles arise from the upper edge of the inner surface of this cup, and their outer surface is formed by a prolongation of the transparent ectocyst, whilst the inner is covered by a more opaque layer of ciliated cells. The vestibular chamber is separated from the visceral part of the polypide by a thin lamina

[1] Brit. Mar. Polyz., vol. i. p. 563.

(intra-tentakuläre Leibeswand, Nitsche), through which passes on one side the œsophagus and on the other the rectum.

3. All the Pedicellinidæ are furnished with a more or less mobile stem, which is either flexible and contractile throughout, or as in *Pedicellina gracilis*, partially flexible and partially rigid, or as in *Ascopodaria*, wholly rigid and chitinous, its motions being effected by a peculiar muscular apparatus at the lower end.

The only forms belonging to this Family that I have noticed in the Challenger collection belong to an apparently distinct genus, to which in 1878 I had given the MS. name of "*Ascopodaria*," as stated in Professor Allman's Linnæan address of 1879. In 1880, however, Mr. Hincks, in a description of some Arctic Polyzoa, described and figured under the name of *Barentsia bulbosa*, a pedicelline species, which, though apparently quite distinct specifically from either of the two Challenger forms, evidently belongs to the genus I had already proposed to establish. In strict right of priority of publication, therefore, his name should have precedence over that merely provisionally given by me, and I should without hesitation have adopted it, but since then he has described and figured a second species, referable, from my point of view, to the same genus, under the name of *Pedicellinopsis fruticosa*,[1] thus giving two distinct names to the same generic type. I have, therefore, felt justified in retaining my original appellation, and in regarding *Barentsia* and *Pedicellinopsis* as synonyms. As an additional argument, though one of less weight, in favour of the course I have pursued, I might cite the appropriateness of the title I chose, indicative as it is of the main peculiarity of the genus.

The Family here contains :—

1. *Ascopodaria.*

   (1) *Ascopodaria fruticosa*, Hincks, sp. (Pls. IX., X. figs. 1–5).
   (2) *Ascopodaria discreta*, n. sp. (Pl. X. figs. 6–12).

1. *Ascopodaria*, Busk.[2]

Ascopodaria, Bk. (MS.), Add. by Prof. Allman, Journ. Linn. Soc. Lond. (Zool.), vol. xv. p. 2.
Barentsia, Hincks, Ann. and Mag. Nat. Hist., ser. 5, vol. vi. p. 285 ; Vigelius, Bijd. Dierk. Genoot., Nat. Art. Mag., Amsterdam, Aflev. ii. pt. 2, p. 85.
Pedicellinopsis, Hincks, *loc. cit.*, vol. xiii. p. 363.
Pedicellina (pars), Sars, Leidy.

Character.—Polypide budding from and supported at the extremity of a chitinous, tubular, perforated stem, which expands below into a cylindrical, barrel-shaped dilatation, lined internally by a layer of longitudinal muscular tissue.

[1] This species is the same as one of the two Challenger forms to which I had given the name of *Ascopodaria socialis*, but I have now as a matter of course adopted Mr. Hincks specific name.

[2] From ἀσκός, a wine-skin, πούς, a foot.

The structure of the peduncle is the character by which this genus is distinguished from *Pedicellina*. The pedicel is rigid and chitinous throughout, and depends for its motion on the muscular fibres which line the barrel-shaped expansion at the base; the central cavity of this expansion as well as of the rest of the stem being filled with an extremely delicate parenchymatous tissue.

The anatomy of the polypides appears to agree almost entirely, as far as I have been able to observe it in the spirit specimens, with the very careful descriptions given by Dr. Nitsche in his paper on *Pedicellina echinata*.[1] The whole polypide or calyx is enveloped in a delicate transparent membrane or ectocyst, lined with a more or less distinct tesselated epithelium. The alimentary canal consists of an œsophagus, stomach, intestine and rectum (Pl. IX. fig. 6); the liver cells extending along the upper side of the stomach present the usual deep yellow colour. In all the specimens that I have examined the rectum lies in a horizontal position forming an angle with the rest of the intestine; whether this is its normal position, as it appears to be in the closely allied genus *Urnatella*[2] or whether it merely is the case during a young stage of growth, as mentioned by Dr. Nitsche, I am unable to decide. I have not been able to observe with any certainty the reproductive organs; but in nearly all the polypides of one species, *Ascopodaria fruticosa*, between the stomach and the base of the vestibular cavity, there are two large, round, ovarian masses (Pl. IX. figs. 6, 8, 9), which are separated from one another by a thin lamina (Pl. IX. fig. 9). In the other species these masses are not apparently always present.

Mr. Hincks has suggested[3] that his genus *Pedicellinopsis* would properly include the *Pedicellina gracilis* of Sars; in this I am disposed fully to agree with him and should therefore propose to include it in my genus *Ascopodaria*. Professor Leidy[4] refers to a species of *Pedicellina* found by him in 1859, which, from the short description given, if not identical with *Pedicellina gracilis*, ought also to be placed in this genus. The known species therefore would be four or five, as follows:—

(1) *Ascopodaria gracilis*, Sars.
(2) *Ascopodaria bulbosa*, Hincks.
(3) *Ascopodaria fruticosa*, Hincks = *socialis*, Bk., MS.
(4) *Ascopodaria discreta*, Bk.
(5) *Ascopodaria* (?), Leidy.

(1) *Ascopodaria fruticosa*, Hincks, sp. (Pls. IX., X. figs. 1–5).

Pedicellinopsis fruticosa, Hincks, Ann. and Mag. Nat. Hist, ser. 5, vol. xiii. p. 364, pl. xiv. fig. 3.

Character.—Zoarium arborescent, constituted of thick, erect, chitinous, jointed, branching stems, arising from tubular stoloniform fibres. The deciduous polypides (or

[1] *Zeitschr. f. wiss. Zool.*, Bd. xx. p. 13.
[2] Leidy, *Journ. Acad. Nat. Sci. Philad.*, 1884, vol. ix. p. 12.
[3] *Loc. cit.*, vol. xiii. p. 364.
[4] *Loc. cit.*, p. 14.

calices, Auctt.) are seated on the upper end of slender tubes or pedicels, which are produced into a single or double point on one side at the top; at its base the pedicel dilates into a thick barrel-shaped cylinder (Pl. IX. fig. 7), which is covered by a transparent, ringed, chitinous envelope (Pl. X. fig. 1), lined with a strong muscular layer, the cavity being occupied by a very delicate fibro-cellular tissue (Pl. IX. fig. 14). The chitinous pedicels have four more or less regular longitudinal series of funnel-shaped perforations. These polypiferous peduncles are seated in a cup-shaped hollow, and attached by a much restricted termination in a spiral direction around the upright stems, communication with the interior of which is maintained through a fine funnel-shaped orifice (Pl. XI. figs. 12, 13). The polypides are of the usual pedicelline character, and have a very short flexible stalk, which is attached just within the upper edge of the chitinous pedicels, and when young is continuous with the inner cellular tissue; when mature the polypides appear to be quite cut off from the pedicels on which they are placed, and from which they bud in succession (Pl. IX. fig. 5). The tentacles vary in number from twenty in a bud to twenty-six or twenty-eight in an adult, and are arranged more or less bilaterally and symmetrically. The pedicels and stems are of a bright light brown colour usually; the stems turning nearly black when old. The polypides are white and the barrels white or nearly so, the transparent chitinous envelope being so thin that the white inner layer shows through.

The total length of the calyx and peduncle is 3·5 to 3·8 mm. The polypide measuring about 0·65 × 0·5 mm., the pedicel 2·3 × 0·07 mm., and the barrel 0·75 × 0·5 mm.

Habitat.—Station 163A, off Twofold Bay, 150 fathoms.

[Port Philip Heads.]

The arborescent growth of this beautiful species distinguishes it at once from all other known Pedicelline forms, but the rest of its structure leaves no doubt as to its belonging to that order.

At first sight it is difficult to observe that the tentacles are not arranged in a perfectly regular and continuous circle, but here and there indications may be noticed that a wider space does occur between two at opposite sides of the circumference, viz., at the two ends of the symmetrical plane of the animal; the bilateral arrangement is most clearly seen in a young budding Polypide (Pl. X. fig. 2) which appears closely to resemble the figures given by Hatschek[1] in his paper on *Pedicellina echinata*, and also the figure and description by Salensky.[2] The buds arise in succession spirally and somewhat in pairs (Pl. X. fig. 1) round the growing ends of the chitinous stems and branches. Fresh polypides also bud from the ends of the pedicels after others have died and dropped off; that this also occurs in *Pedicellina* has been noticed and described by Salensky,[3] and

[1] *Zeitschr. f. wiss. Zool.*, Bd. xxix. pl. xxx. figs. 39, 40, 45. [2] *Ann. d. Sci. Nat.*, sér. 6, t. v. p. 36, pl. xv. fig. 36.
[3] *Loc. cit.*, pp. 30, 31.

is mentioned by Professor Leidy[1] as occurring in *Urnatella*, but I have not found it referred to by any other writers on the Pedicellinea.

Pl. X. fig. 1, represents a group of buds at the end of one of the branches, and also shows the barrel-shaped expansion at the base of one of the peduncles, from which the transparent ringed covering has been partially loosened and torn off by the process of boiling. Figs. 3 to 5 on the same plate are taken from sketches made by the late Sir C. Wyville Thomson when the specimens were fresh and alive.

(2) *Ascopodaria discreta*, n. sp. (Pl. X. figs. 6–12).

Character.—The zoarium consists of a creeping stoloniferous stem, jointed at intervals where the branches are given off or where the polypides arise. The deciduous polypides are seated at the upper end of slender chitinous pedicels, which are dilated below into barrel-shaped cylinders that have a thick, ringed, chitinous envelope, and exactly resemble those of the preceding species. The polypiferous peduncles are seated by a broad base on the stoloniform stems; usually singly on the somewhat expanded jointed bifurcation of four branches (fig. 11), but sometimes scattered along the stolons (fig. 12). The chitinous pedicels are irregularly punctured by minute funnel-shaped pores. The polypides are united to the pedicels by a spirally ringed flexible joint (fig. 12). The tentacles are from sixteen to twenty in number. The pedicels and stolons are of a bright brown, horny colour, the polypides white, and the barrels also white or very light brown, appearing darkest when quite young, the chitinous envelope becoming thinner and more transparent as the animal grows older.

The total length varies considerably, apparently according to age; the majority of the older ones measure as much as from 4·25 to 4·4 mm. The polypide being about 0·5 × 0·4 mm., the pedicel 3·0 × 0·6 mm., and the barrel 0·7 × 0·24 mm. This species is, therefore, on the whole, taller and more slender than the preceding one.

Habitat.—Station 135, off Nightingale Island, Tristan da Cunha, 100 to 150 fathoms.

There were very few specimens in all of this species in the collection, and, therefore, it has not been possible to enter into a full and minute examination of the polypide, but it appears to present all the usual Pedicelline characters.

[1] *Journ. Acad. Nat. Sci. Philad.*, vol. ix. pt. i. p. 13.

INDEX.

GENERA, SPECIES, AND VARIETIES.

(Synonyms printed in *italics*.)

	PAGE
Actinopora,	25
ADNATA seu DECUMBENTIA,	21
Alcyonidiidæ,	30
Alcyonidium,	31
flustroides,	31
ALCYONIDULÆ,	30
Alcyonium,	31
Alecto,	22
granulata,	22
parasitica,	22
Amathia,	33
bicornis,	34
brasiliensis,	34
connexa,	35
distans,	33
lendigera,	33
semispiralis,	36
spiralis,	34
tortuosa,	34
ARTICULATA seu RADICATA,	1
Ascopodaria,	41
discreta,	44
fruticosa,	42
Aulopora,	22
Auloporina,	1
Avenella,	38
Barentsia,	41
Berenicea,	24
Bicrisia,	2
Caveidæ,	25
Cellaria,	2
artica,	4
denticulata,	4

Cellaria—continued.	PAGE
eburnea,	4
Cellularia,	2
eburnea,	4
Centrifuginea,	1
Centrifuginés empâtés à cellules non operculées,	8
Centrifuginés radicellés,	32
Cerioporа,	22
Cerioporidæ,	26
Cerioporina,	1
Cerioporinæ,	26
Corallium,	15
Corymbopora,	27
Corymbosa,	27
ramosa,	27
Crisia,	9
Crisia,	2
acropora,	6
acuminata,	5
biciliata,	3
conferta,	7
cylindrica,	7
denticulata,	4
var. gracilis,	5
var. patagonica,	5
eburnea, var. laxa,	4
elongata,	5
holdsworthii,	6
luxata,	4
CRISIADÆ,	1
Crisidæ,	1
Crisidea,	1
Crisidia,	2

	PAGE
Crisieæ,	1
Crisies, Les,	1
Crisiidæ,	1
Crisina,	9
hochstetteriana,	11
CTENOSTOMATA,	30
CYCLOSTOMATA,	1
Cycloum,	31
CYLINDRŒCIDÆ,	38
Cylindrœcium,	38
papuense,	38
Defrancia,	25
Diastopora,	9, 22
Diastopora,	24
patina,	24
Diastopores simples,	24
DIASTOPORIDÆ,	24
Discocavea,	25
Discopora,	25
hispida,	26
Discoporadæ,	25
Discoporella,	25
fimbriata,	26
hispida,	26
Discoporellidæ,	25
Discosparsa marginata,	24
patina,	24
Entalophora,	18
anomale,	19
attenuata,	19
deflexa,	20
haastiana,	19
icaunensis,	19
proboscidea,	19
raripora,	19
ENTOPROCTA,	40
ERECTA,	8
Eucratea,	2
Falcaria,	2
Farrella,	38
Farrella,	37
atlantica,	37
Fasciculinea,	26
Fasciculipora,	28
Fasciculipora,	27
digitata,	29
ramosa,	27
Fascigeridæ,	26
Filicrisia,	2

	PAGE
Frondipora,	27
ramosa,	27
FRONDIPORIDÆ,	26
Fungella,	27
prolifer,	27
HALCYONELLEA,	30
Halcyonelleæ,	30
Halodactylus,	31
Heteroporella,	25
radiata,	26
hispida,	26
Hornera,	14
affinis,	15
andegavensis,	15
borealis,	15
foliacea,	17
frondiculata,	15
lichenoides,	15
radiata,	10
serrata,	15
tubulosa,	15
violacea,	16
Horneridæ,	8
Idmonea,	9
angustata,	10
atlantica,	10
australis,	12
coronopus,	10
eboracensis,	12
fissurata,	14
marionensis,	11
milneana,	13
irregularis,	14
radians,	10
transversa,	13
Idmoneadæ,	8
IDMONEIDÆ,	8
INARTICULATA,	8
Incrustata,	8
Lagenella,	37
Laguncula,	37
Laomedea,	36
Lichenopora,	25
fimbriata,	26
hispida,	26
LICHENOPORIDÆ,	25
Madrepora,	25
Millepora,	14
lichenoides,	15

	PAGE
Millepora—continued.	
tubipora,	15
Millépores à cellules,	1
Myrioporina,	1
Nit Coralline,	33
Patinella,	24
verrucaria,	24
patina,	24
Pedicellina,	41
Pedicellinæ,	40
PEDICELLINEA,	40
PEDICELLINIDÆ,	40
Pedicellinopsis,	41
fruticosa,	42
Phalangella,	22
flabellaris,	23
phalangea,	23
Polypiaria pedicellinea,	40
Polyzoa carnosa,	30
Proboscina,	22
Pustulipora,	18
proboscidea,	19
deflexa,	20
Pustulopora,	18
clavata,	20
deflexa,	20
orcadensis,	16
proboscidea,	19
proboscidioides,	19
regularis,	21
subverticillata,	21
virgula,	19
Radicellata,	1
Retepora,	9, 14
radians,	10
Retihornera,	16
foliacea,	17
dentata,	17
plicata,	17
Sarchochitum,	31
Serialaria,	33
lendigera,	33
convoluta,	34
semispiralis,	36
spiralis,	34
Sertolara d'avorio, La,	4
Sertolara lendinosa, La,	33
Sertularia,	2, 33, 36
eburnea,	4

	PAGE
Sertularia—continued.	
lendigera,	33
Sparsidæ,	21
Stolonifera,	32
Stomatopora,	22
deflexa,	20
granulata,	22
Supercytis,	28
digitata,	29
tubigera,	29
Syphodictyum,	14
Tervia,	13
folini,	14
Tibiana,	2
Tubigeridæ,	8, 25
Tubipora flabellaris,	23
serteus,	23
Tubulipora,	9, 18, 22, 24, 25
Tubulipora,	22
deflexa,	20
fimbria,	23
fimbriata,	23
flabellaris,	23
hispida,	26
patina,	24
phalangea,	23
verrucaria,	23
TUBULIPORIDÆ,	21
Tubuliporidæ,	8, 24
Tubuliporiens, Les,	8
Tubuliporina,	1
Unicavea,	25
Unicellaria,	2
Unicrisia,	2
Valkeria,	33, 36
lendigera,	33
Valkeriidæ,	32
Vesicularia,	38
Vesicularia,	36
papuensis,	36
trichotoma,	37
Vesiculariadæ,	32
VESICULARIDÆ,	32
Vesiculariea,	32
Vesicularieæ,	32
Vesiculariidæ,	32
VESICULARINA,	32
Vesicularina,	30

PLATE I.

PLATE I.[1]

Crisia.

			Diam.	Page
Figures 1, 2.—*Crisia biciliata*, natural size,				3
	1*a*, front; 1*b*, back; 1*c*, oœcium; 2*a*, side view,	×	50	
,,	3.—*Crisia elongata*,			5
	3*a*, part of the zoarium, front view,	×	25	
,,	4.—*Crisia denticulata*, var. *gracilis*,			5
	4*a*, part of the zoarium, front and back; 4*b*, oœcium; 4*c*, occasional mode of attachment to a sponge spicule; 4*d*, terminal process,	×	25	

[1] A scale in millimetres is marked near the lower right-hand corner of Plates I.–VIII., which applies to all the figures on each, except where a different scale is marked.

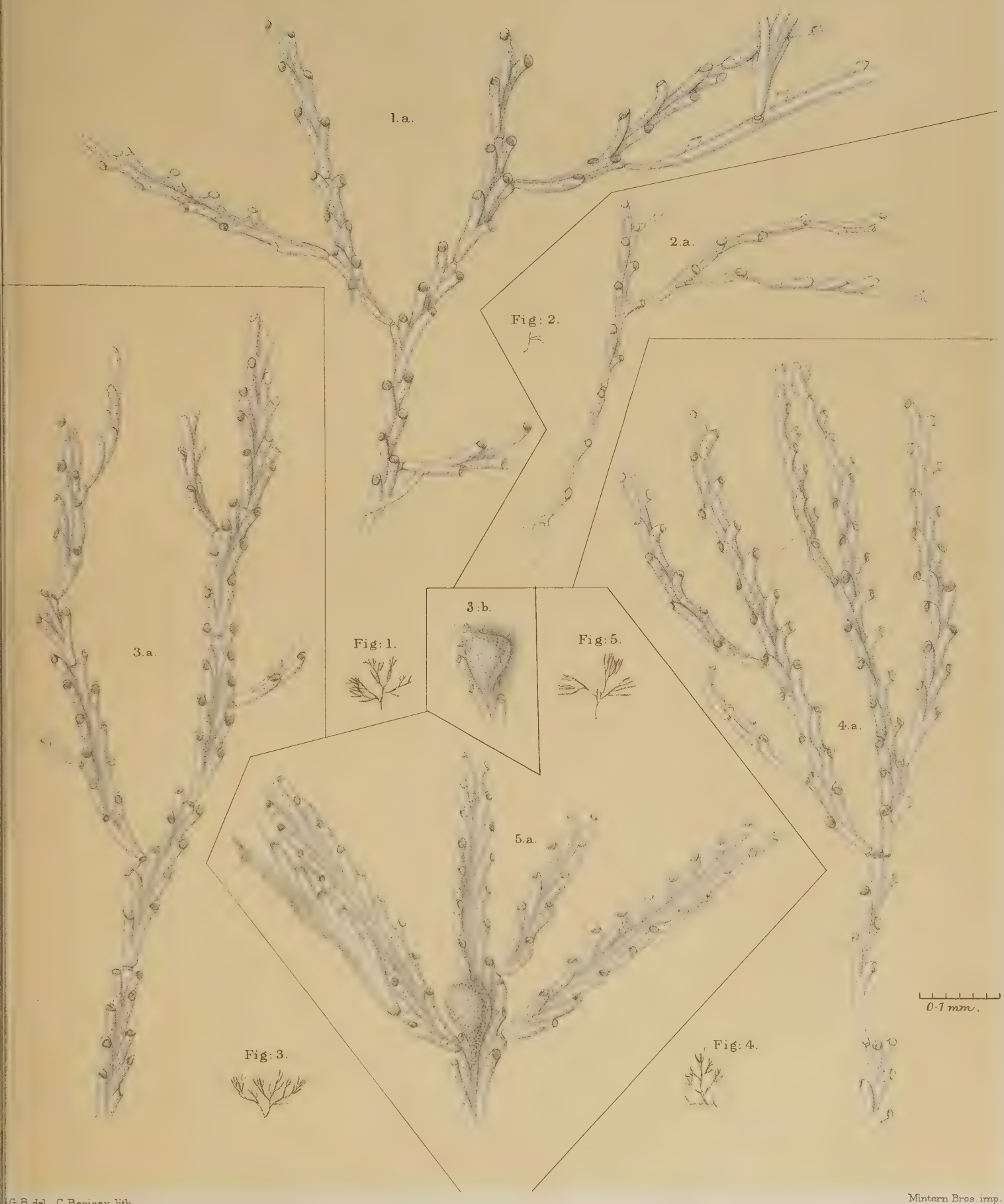
1.a
1.b.
1.c.
0·1 mm.
Fig: 1.
Fig: 2.
2.a.
Fig: 3.
3.a.
4.b.
4.a.
Fig: 4.
4.c.
4.d.
0·1 mm.
0·1 mm.
0·1 mm.

PLATE II.

PLATE II.

Crisia.

		Diam.	Page
Figure 1.—*Crisia eburnea*, var. *laxa*,			4
	1*a*, part of the zoarium, front,	× 25	
„ 2.—*Crisia cylindrica*,			7
	2*a*, lower portion of a young zoarium,	× 25	
„ 3.—*Crisia denticulata*,			4
	3*a*, front; 3*b*, oœcium,	× 25	
„ 4.—*Crisia cylindrica*,			7
	4*a*, older part of zoarium, front,	× 25	
„ 5.—*Crisia conferta*,			7
	5*a*, part of the zoarium, with oœcium,	× 25	



G.B. del. C Berjeau lith.

Mintern Bros. imp.

CRISIA.

PLATE III.

PLATE III.

Crisia.—Idmonea.

		Diam.	Page
Figure 1.—*Crisia acuminata*,			5
	1*a*, part of a branch, front view; 1*b*, 1*c*, 1*d*, terminal processes,	× 25	
„ 2.—*Crisia holdsworthii*, oœcium,		× 25	6
„ 3.—*Idmonea australis*,			12
	3*a*, front; 3*b*, back,	× 25	
„ 4.—*Idmonea eboracensis*,			12
	4*a*, front; 4*b*, oœcial dilatation,	× 25	
	4*c*, back,	× 50	
„ 5.—*Idmonea fissurata*,			14
	5*a*, front of young portion of zoarium; 5*b*, older part; 5*c*, back,	× 25	

J.B. del.

Geo. West & Sons, lith. et imp.

CRISIA, IDMONEA.

PLATE IV.

PLATE IV.

Pustulopora.

		Diam.	Page
Figure 1.	*Pustulopora proboscidea*, ...		19
	1*a*, part of zoarium; 1*b*, oœcial dilatation, . .	× 25	
„ 2.	*Pustulopora regularis*, ...		21
	2*a*, terminal fork, ...	× 25	
„ 3.	*Pustulopora deflexa*, ...		20
	3*a*, bifurcation of zoarium, ...	× 25	
„ 4.	*Pustulopora proboscidioides*, ...		19
	4*a*, 4*b*, two portions of the zoarium, . . .	× 25	

J.B. del.

Geo. West & Sons, lith. et imp

PUSTULOPORA.

PLATE V.

PLATE V.

Tubulipora.—Supercytis.

			Diam.	Page
Figure 1.—*Tubulipora flabellaris*,				23
	1*a*, front; 1*b*, back,	×	25	
	1*c*, orifice,	×	50	
„ 2.—*Tubulipora fimbria*,				23
	2*a*, front, with oœcium,	×	25	
	2*b*, orifice,	×	50	
„ 3.—*Supercytis digitata*,				29
	3*a*, the zoarium,	×	9	
„ 4.—*Supercytis tubigera*,				
	4*a*, the zoarium, with oœcia,	×	9	29

G.B & J.B. del. Geo. West & Sons lith et imp

TUBULIPORA, SUPERCYTIS.

PLATE VI.

PLATE VI.

Amathia.

		Diam.	Page
Figure 1.—*Amathia tortuosa*,			34
	1*a*, part of a branch; 1*b*, showing the exserted neck,	× 25	
„ 2.—*Amathia spiralis*,			34
	2*a*, 2*b*, portions of the zoarium,	× 25	
„ 3.—*Amathia connexa*,			35
	3*a*, part of the zoarium; 3*b*, another part, showing the commencement of a branch,	× 25	

J.B. & F.B. del.

Geo. West & Sons lith. et imp.

AMATHIA.

PLATE VII.

PLATE VII.

Amathia.—Farrella.

		Diam.	Page
Figure 1.—*Amathia distans*, ...			33
1*a*, part of the zoarium, ...	×	25	
1*b*, young spiral not fully developed; 1*c*, showing exserted necks, ...	×	50	
„ 2.—*Amathia brasiliensis*, ...			34
2*a*, 2*b*, portions of the zoarium; 2*c*, long, barren-jointed, terminal filaments; 2*d*, 2*e*, occasional scattered zoœcia, . . .	×	25	
„ 3, 3*a*.—*Farrella atlantica*, ...	×	50	37
3*b*, 3*c*, zoœcia with polypides; 3*d*, with quadrangular orifice; 3*g*, young zoœcium, . .	×	110	
3*e*, 3*f*, different forms of zoœcia, . . .	×	50	

G.B. & J.B. del.

Geo. West & Sons lith. et imp.

AMATHIA, FARRELLA.

PLATE VIII.

PLATE VIII.

AMATHIA.—VESICULARIA.—CYLINDRŒCIUM.

	Diam.	Page
Figure 1.—*Vesicularia papuensis*, ...		36
1*a*, part of the zoarium, ...	× 25	
1*b*, zoœcia with polypides, ...	× 110	
1*c*, bifurcation of the zoarium, . . .	× 50	
„ 2.—*Cylindræcium papuense*, ...	× 25	38
„ 3.—*Amathia semispiralis*, ...		36
3*a*, part of the zoarium ; 3*b*, young growing end, .	× 25	
„ 4.—*Vesicularia trichotoma*, ...		37
4*a*, magnified, ...	× 25	
4*b*, zoœcium and buds, ...	× 50	

Geo. West & Sons lith. et imp

AMATHIA, VESICULARIA, CYLINDROECIUM.

PLATE IX.

PLATE IX.[1]

ASCOPODARIA.

		Diam.	Page
Figure	1.—*Ascopodaria fruticosa*, natural size, ...		42
,,	2.—A single zoœcium and polypide, . . .	× 25	
,,	3.—A single polypide, with the tentacles coiled within the open edge of the cup, . . .	× 50	
,,	4.—Another polypide, with the edge of the cup contracted, ...	× 50	
,,	5.—A young polypide budding from the end of an old pedicel, ...	× 50	
,,	6.—A single polypide, showing the visceral organs, .	× 110	
,,	7.—Barrel-shaped expansion at the base of a pedicel, .	× 50	
,,	8, 9.—Longitudinal sections through a polypide, . .	× 110	
,,	10.—Portion of stem, with bases of peduncles, . .	× 25	
,,	11.—Longitudinal section of stem, ...	× 50	
,,	12, 13.—Transverse sections of stem, ...	× 50	
,,	14.—Portions of the parenchymatous tissue, from the centre of the stem, ...	× 360	

[1] Several references used on this plate:—*i*, intestine; *l*, liver cells; *œ*, œsophagus; *om*, ovarian masses; *r*, rectum; *s*, stomach; *t*, tentacles.

Fig. 1.

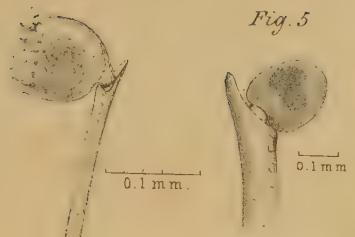


Fig. 5.

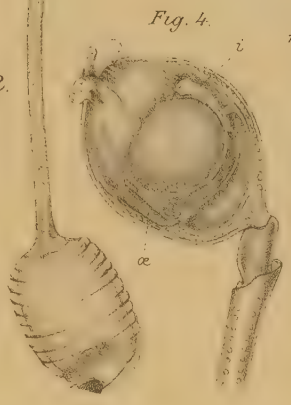


Fig. 4.

Fig. 2.

Fig. 6.

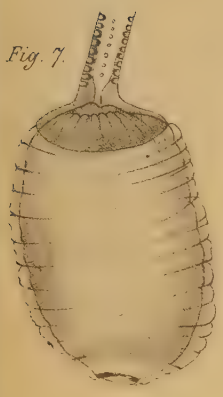


Fig. 7.

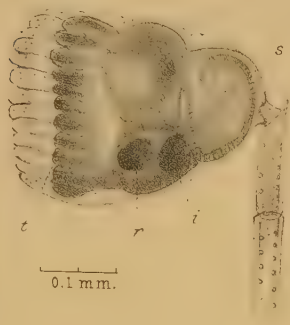


Fig. 3.

Fig. 8.

Fig. 9.

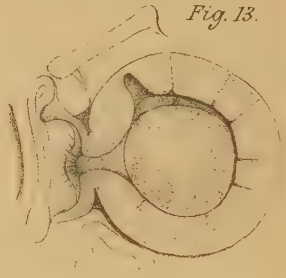


Fig. 13.

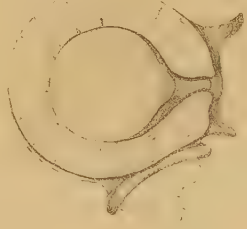


Fig. 12.

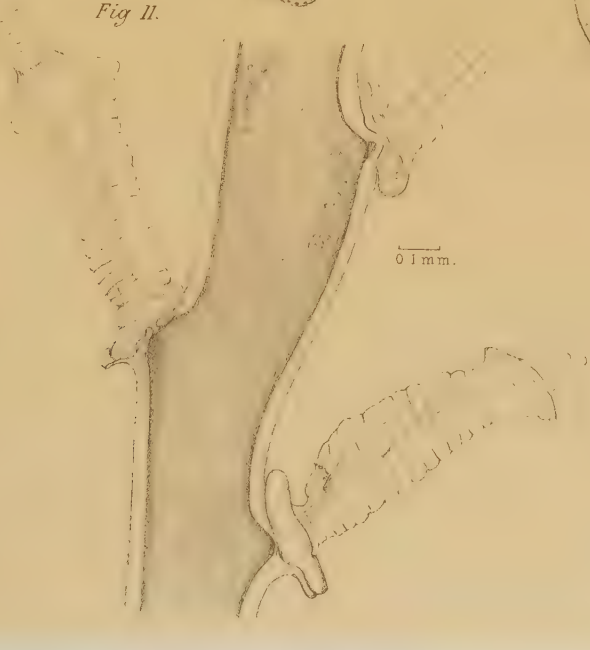


Fig 11.

Fig. 10.

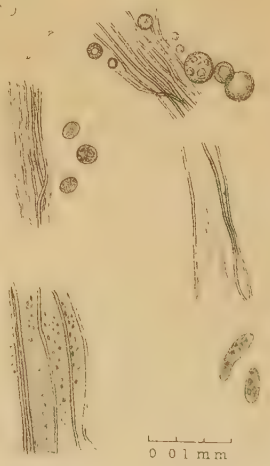


Fig. 14.

C.E., J.B & F.B. del.

F Huth, Lith^r Edin^r

ASCOPODARIA.

PLATE X.

PLATE X.[1]

Ascopodaria.—Alcyonidium.

		Diam.	Page
Figure	1.—*Ascopodaria fruticosa*, group of young buds at the end of a branch, also showing the transparent envelope of a barrel which has been partially torn off, and the cup-like sockets in which the peduncles are seated, ...	× 50	43
„	2.—A single bud, showing the bilateral arrangement of the tentacles, ...	× 110	
„ 3, 4, 5.	—After sketches of the same, taken when fresh by the late Sir C. Wyville Thomson, . . .		
„	6.—*Ascopodaria discreta*, a single polypide, . .	× 50	44
„	7.—Two buds at the end of a stolon, . . .	× 50	
„	8.—A single zoœcium and polypide, . . .	× 25	
„	9.—A single zoœcium, also showing stolon and buds, .	× 50	
„	10.—A group of zoœcia, ...	× 25	
„	11.—Stolon with bud and the base of two peduncles, .	× 50	
„	12.—The spirally ringed segment by which the polypide is attached to the pedicel, ...	× 110	
„	13.—*Alcyonidium flustroides*, ...		31
„	14.—Portion of the zoarium, with scattered ova and "brown bodies,"	× 25	

[1] Several references used on this plate:—*i*, intestine; *l*, liver cells; *œ*, œsophagus; *om*, ovarian masses; *r*, rectum; *s*, stomach; *t*, tentacles.

Fig. 1.

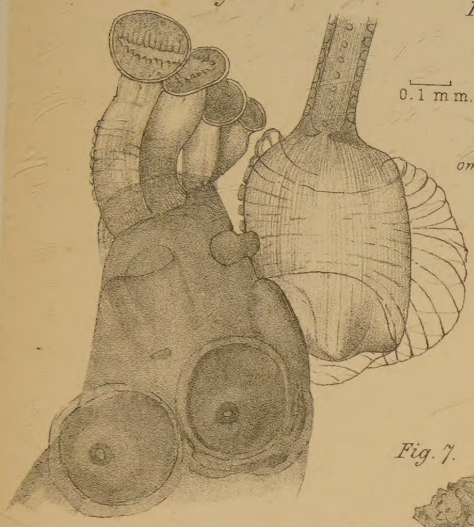


Fig. 6.

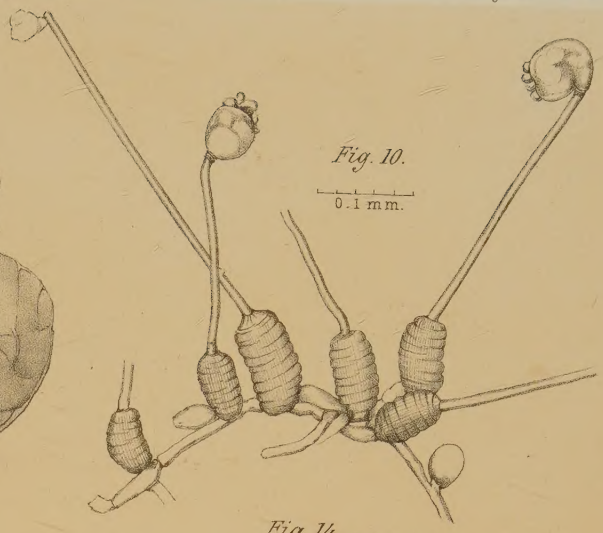


Fig. 7.

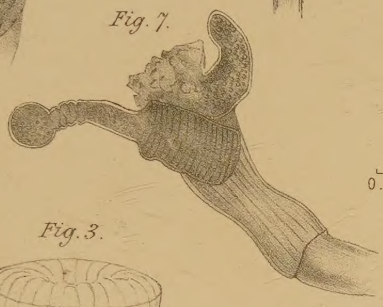


Fig. 9.

Fig. 14.

Fig. 2.

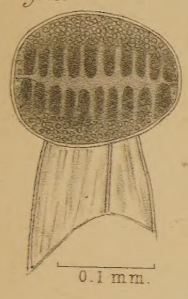


Fig. 3.

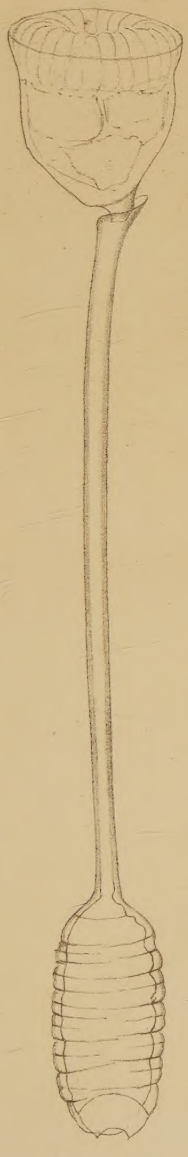


Fig. 8.

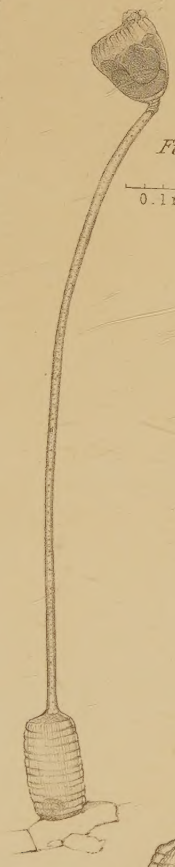


Fig. 4.

Fig. 11.

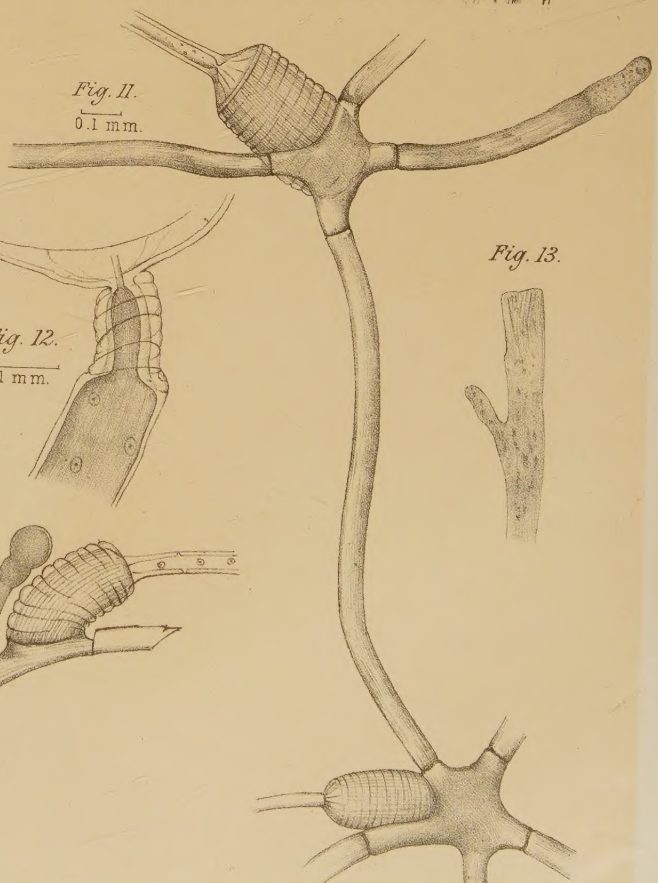


Fig. 12.

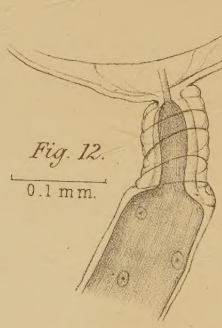
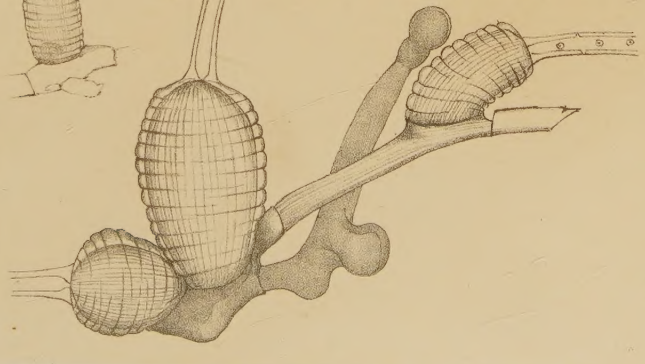


Fig. 13.

Fig. 5.



Phys 5

The Zoology of the Voyage of H.M.S. Challenger.

Vol. XVII

PART L.

REPORT ON THE POLYZOA.

SECOND PART.

By GEORGE BUSK.

Price Six Shillings.

3644